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CHICAGO, JANUARY 1913.

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TWO CONVENTIONS THIS TIME.

NOT many months ago this page of TELEPHONE ENGINEER was occupied by an editorial entitled "Independent Telephony." If its comments were not particularly flattering, they were sincere; for we were, and are, concerned about the general air of listlessness which has pervaded the independent camp for some time.

It appears, however, that not all the prominent independent operators have been content to let their half of the country's telephone business go its own sweet way unguided. Out of Pittsburg has come a call for a new independent national association, and the meeting to effect the new organization is to be held in the Antlers Hotel, Pittsburg, at 2 p. m., Thursday, January 16.

John H. Wright, of Jamestown, New York, is sponsor for the new movement. Previous meetings have been held; the first on October 11, 1912, at Cambridge Springs, Pa., in which seven state associations took part, and the second, a committee meeting, at Pittsburg, on November 15, 1912. At the latter meeting it was unanimously decided that the present National Independent Telephone Association "does not truly represent the independent telephone interests of the United States." The new body, it is declared, will be independent in principle as well as in name.

The effort to organize another association is extremely interesting. We have not been inclined to lay the present desuetude of the independent cause at the doors of the existing association, as represented by its officers; we think the blame rests on the individual members. But if it be possible to form another association whose motives shall be so consequential and whose officers shall be so vigorous and efficient that the individual members will be exalted in spirit and renewed in enthusiasm, then let the old body pass out and proclaim the new one. And if, on the other hand, the new movement infuse into the old one a restored virility and vigor, it will have had its desired effect, and may well die a-borning. Either way, we are likely to have a little more activity and interest than the independent cause has enjoyed for some time—and it surely needs a tonic of that sort.

The regular or orthodox national convention will be held in Hotel LaSalle, Chicago, February 18, 19 and 20, where it was held two years ago. Even without the spur of criticism from Pittsburg, the sessions will probably be lively. Every year the lines have been drawn tighter, and the old spirit of the independents has become more and more subdued.

The convention program has not yet been announced. Much of it must, perforce, be given over to subjects which, unknown a few years ago, have usurped a predominance of attention. Chief of these is commission regulation, whose problems will not be solved to every-

body's satisfaction for years to come—perhaps not this side of the milennium. At present even the exact authority of the Interstate Commerce Commission is in question—as witness the following resolutions adopted by the board of directors of the National Association at the meeting which fixed the date of the convention:

Be it Resolved, That it is the sense of this board of directors that it will inure to the interest of the telephone using public and the investors in telephone securities, if the jurisdiction and powers of the Interstate Commerce Commission over interstate telephone traffic should be more clearly and fully defined.

Be it further Resolved, That the president and two other members of this board of directors, to be appointed by him, shall constitute a committee to prepare suggestions for a bill to be introduced in Congress for such amendments as may seem necessary to existing law, to fully vest in the Interstate Commerce Commission power to regulate rates, prescribe character of service, and the conditions under which it shall be given, and such other and further powers as may seem to said committee to be wise.

Be it further Resolved, That at the request of this committee, the president shall call a meeting of the board of directors of this association to consider such proposed bill, and in any event, that such committee shall report at the next regular meeting of this board of directors.

President Savage appointed the following directors to serve on the committee which will carry this resolution into effect: H. D. Critchfield, A. A. Godard, F. H. Woods and N. G. Hunter. Mr. Savage is also ex-officio a member of the committee.

The Interstate Commerce Commission has prepared a very voluminous system of accounts for telephone companies, effective January 1. This work comprises some eighty printed pages, and although not yet distributed, will be ready for convention discussion, and may be expected to occupy some time.

The conduct of telephone utilities, independent or otherwise, is daily becoming more complex, if less warlike. Perhaps the latter condition is a result of the former.

The old telephone game was a fight, unremitting and exhausting. Fighting is not compatible with good business management, because it is not economical. It took both independent and Bell forces many years to discover this fundamental fact.

But no logical reason is apparent why the cessation of hostilities should sound the death-note of independent spirit. The independents were born to war; they were volunteers in a battle against monopolistic oppression. They succeeded. For the wonderful condition of telephony today, for excellent service and universal distribution and equitable rates, the independents deserve credit. Much progress was made at the point of the sword.

But, though the sword is now in its scabbard, the independent army must be maintained. Telephony still needs it.

Fighting blood courses fast, and stirs to great deeds. It is hard to maintain enthusiasm at fever heat in an atmosphere of pure commercialism. The more reason, then, for a vigorous, virile association—not just a casual figure-head, representing an industrial faction in a perfunctory way. And if the members thoroughly realize that fact, it will not be necessary to organize a new body. That should be only a last resort—for internal dissension always means loss of efficiency, and generally spells defeat. We need not look far back into political history to discover proof of that principle.

Let the independents, members of the existing National Association, come to the convention in February determined to renew the old spirit at all costs—not the spirit of sentiment, nor the spirit of warfare, but the spirit of real independence, each resolved to serve his public equitably, without fear or favor, owning allegiance only to that public and to himself.

The Hotel LaSalle convention hall is a big room, built for rousing meetings. Our esteemed contemporary names as one of its qualifications that it has a high ceiling. With a little of the old spirit, the independent conclave can raise it still higher.

THE CHICAGO SITUATION.

CHICAGO'S telephone problem and its attempted solution by the city council with the aid of various experts, is arousing a great deal of attention. The questions of determination of value raised by the investigation must have their effect upon the future conduct of the business. If the work of E. W. Bemis, the city's latest investigator, has accomplished nothing else, it has shown the crying need for accurate standards as a basis for rate-making. The issue of *Weber's Weekly* for December 14 is devoted to the subject of "Telephone Rates." While Mr. Weber perhaps adds nothing to scientific knowledge, his faculty for explaining complex matters in a simple way makes his treatment of the Chicago situation very interesting. We believe some of his remarks may be helpful to those telephone men who have not made a special study of rate causes, and so make no apology for reproducing them here:

In 1907 the Chicago city council extended the Chicago Telephone Company's franchise ordinance to 1929. At the same time it fixed the rates which the company might charge subscribers for a period of thirty months for the purpose of making an experimental test of their reasonableness.

The law of 1905 authorizes the city council to fix the rates which gas and electric lighting concerns may charge, once every five years. Although not included in the law, the telephone company accepted in its franchise extension similar regulation of its rates. Determination of the rates thus provided to be fixed is the basis of the existing controversy.

The telephone company's contract ordinance with the city, as well as the state and federal constitutions, and all court decisions on that subject, guarantee to every corporation a reasonable return on its "necessary investment." This raises two principal questions:

1. What is the "necessary investment" on which the company is entitled to earn a reasonable return?
2. What rate or per cent of return on the necessary investment may properly be fixed as reasonable?

Of course, the "return on the investment" means that which goes to the investor after expenses for operation, repairs and maintenance, taxes, including 3 per cent gross income tax paid to the city, and other similar items of expense have been provided for. No controversy has arisen concerning the amount paid out by the company in wages, which the United States census reports show to be the highest rate for service paid by any similar concern east of the Rocky Mountains; and the company also provides for old age pensions for its employees. Not much has been said adversely about any of the "running expenses" which the books of the company show to have been paid out. The company is not accused of over-capitalization.

The Byllesby-Arnold report showed the necessary investment—the cost to reproduce—to be $39,644,523.00.

These figures—the only appraisal of the company's property ever made by any of the experts of either the city or company—indicate that the company is not now receiving enough income to provide for interest and to guard against depreciation. Therefore, in order to sustain a report that must be popular politically, without himself having made an inventory or appraisal, Bemis proceeds to attack the Byllesby-Arnold appraisal in his report, although he concedes to the makers of it "well-known ability and integrity of purpose." It will not be possible to fully traverse the objections raised to the report by Prof. Bemis. One of the points he criticises is the fact that the Byllesby-Arnold report shows what it would

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now cost to reproduce the company's plant, and that this cost of reproduction would be somewhat in excess of what was actually paid for certain kinds of property, especially land. The "book-values" established by the Byllesby-Arnold investigation covered a period of 30 years and the records were admittedly incomplete, not showing all expenditures, which was to the disadvantage of the company. In his report, page 36, Bemis concedingly says:

"How to treat the increase in land values, in a rate case like this, has been and still is a much disputed and unsettled question. The tendency of the courts has been toward the recognition of this increased value."

I will not endeavor to go into this question further than to say that it appears to me that the investor, having risked possible loss when he bought the lands, is entitled to the increased value of the lands, and a reasonable return thereon, especially if the company be taxed on the increase as the telephone company is. However, it may rightly be said that the increase of the value of the land owned and used by a public utility corporation is of no advantage to the company unless it has occasion to sell it and buy less expensive real estate.

The whole question really narrows to this: Shall the "book-value" of the company—what the company paid for its property, item by item—be taken as the basis of its rate-making; or, shall the cost-to-reproduce value be used as the proper basis? If we accept the book-value system and apply it to all public utility corporations, then the public in many cases will have to pay interest on unwise, and perhaps fraudulent, investments. In fact, no universal rule can be devised that will fairly apply to all cases. Each corporation requires a rule peculiar to itself, governed somewhat by the risk which the investor took when, at first, he made his investment in the property, which, instead of depreciating, increased in value.

Other objections to the Byllesby-Arnold report raised by Bemis relate to the price of copper, the cost of the paving over conduits in the streets and the amount of "working capital" required. Fault is found with the reproduction-cost estimates because they include, in some cases, the profits of supposititious contractors, who might have been employed to do some of the construction work.

This brings us to the second question—Depreciation; and, the depreciation element of the city-telephone company franchise contract ordinance is widely different from the ordinary depreciation factor usually considered in economics, which means the actual wearing out of the articles or appliances used, as, for example, the wearing out of a railway rail.

The ordinance requires that the telephone company must maintain its plant equipment and service "at the highest practicable efficiency" and, also, that "all available apparatus, appliances, equipment and methods of service must be promptly adopted." This amounts to saying that new and unforeseeable inventions must be installed at once they become desirable and available, even though the devices which they displace have not been in use long enough to even partially pay for themselves. This requirement by the ordinance makes it the duty of the city to see to it that the rates which the city fixes for service shall be sufficiently high to provide for such new installation. If provision be not made in its rates, the company will have to issue new securities to pay for the new installation and methods required and the telephone company's patrons will have to provide for the interest on such securities in the annual rates they pay for service. Anyone can readily perceive that, unless the investor is protected in this manner in his investment, he will not put his money into the company's securities.

There is no dispute as to the fact that an ample depreciation allowance should be made. The Interstate Commerce Commission has recently spoken on this subject, saying:

"Every telephone company shall include in its expenses depreciation charges for the purpose of creating proper and adequate reserves to cover the expenses of depreciation currently accruing in its fixed capital.

"By expense or depreciation is meant the loss suffered through the current lessening in value of tangible property from wear and tear, decay, obsolescence or inadequacy resulting from use, age, physical change, or supersession by reason of new inventions and discoveries, changes in popular demand or public requirements; also losses suffered through destruction of property by extraordinary casualties, and decreases in the value of intangible property through lapse of time."

It is a popular fallacy that a public utility security may be sustained at par if the return on it is the same as real estate loan rates of interest. This view is erroneous, because real estate loans are not made to the full value of the mortgaged property—one-third to two-thirds of the value of the property being the amount of the loans, the depreciation feature is thus provided against. In public utility concerns the securities outstanding cover the full value of the property and the depreciation must be provided for by an annual charge included in the rates. Thus the annual return of the telephone company must provide, not only for interest and dividends, but also for replacements and new inventions. It must, also, take into account that the franchise of the company will expire in about seventeen years and that after 1918 the company's entire holdings may be taken over by the city at their appraisal value, with 5 per cent added.

Prof. Bemis' report is by no means lucid, but is turgid and bewildering, on his propositions concerning the rate per cent which he would allow on his assumed necessary investment for depreciation.

However, it is not the design of this article to go into an extended discussion of what the depreciation rate should be. It is enough to say that Prof. Bemis' report is by no means illuminating on that phase of the subject; and that, on the whole, he appears to have endeavored to force a showing that will popularize his employers politically rather than to establish even-handed justice or insure for future Chicago the best possible telephone service. In some respects, Prof. Bemis has exhibited remarkable defiance of consistency. This is his first telephone case, and he has entered upon it as a novice. Nevertheless, he has ruthlessly set aside the statements of men who have spent their lives in the business, and has even disregarded the judgment of his own accepted accountants, for, in fact, the strongest points scored in favor of the telephone company are based on the Marwick, Mitchell, Peat & Company accountant examination, which was made by Prof. Bemis' direction and at the expense of the city.

The "Telephone Question" is simply this: The experimental rates of 1907 were found to be unreasonably low by the Jackson-Young "arbitration" commission of 1910. This finding was a disappointment to politicians who sought to make individual personal capital out of telephone rate reductions. Mr. Hagenah of the Wisconsin—La Follette—Commission was then brought to Chicago and, reducing all that he could, said that about 75 cents per year per telephone—$200,000—was near right. This was not enough to satisfy those who were using telephone rate reductions in their political business. They required greater reduction. As a result, Edward W. Bemis, "Tom" Johnson's long-time ally and financial protege, was secured to make the needed further reductions. This he has done for reasons by no means made clear in his own voluminous report. The aggregate difference between the Jackson-Young report and that of Bemis is about $1,600,000 a year—the former recommending an increase of $900,000 a year, Bemis suggesting a reduction of $700,000. It is worth while to say, in this connection, that the percentage of gross profits that goes to the investors in its stocks and bonds is much below that of other similar public utility concerns in other large cities. Public utility regulation should not be used for personal politics, but should be based on economics and far-sighted public policy.

INCANDESCENT LAMP MADE TO SPEAK

The incandescent lamp is not the mute electrical apparatus that we have always supposed it to be. It has just been discovered that given the right conditions it may be made to speak as readily as the arc, which for the last fifteen years has monopolized this accomplishment. According to *Physikalische Zeitschrift,* Messrs. K. Ort and J. Ridger have used a metal filament lamp as a telephone receiver. An Osram lamp of 100 candlepower is employed. The lamp is placed in a 120-volt direct-current circuit including a self-induction coil. Shunted across the two terminals of the lamp are a capacity and the secondary of a telephone transformer, the primary of which connects with a battery of five storage cells and a powerful microphone. Words spoken before the microphone are reproduced in the lamp. The discoverers of the speaking incandescent lamp explain

the action on the principle that the telephonic current variations superposed on the current that passes through the lamp produce corresponding variations of heat in the filament, which radiating to the glass of the bulb, cause the latter to expand and contract proportionately and thus transmit the vibrations to the exterior air. This effect cannot be produced with 16 or 32 candle-power lamps because the glass is to thick and the heat variations too feeble.

BUSINESS WOMAN SUCCEEDS BY TELEPHONE

An article about "A Business Woman Who Is a Real Business Woman," and who shows that she is such by practically conducting a large lighterage and towing business by means of the telephone, appears in *Pearson's Magazine*.

The lady in question is Mrs. Teresa A. Shannon Sheridan, for the past ten years actual manager of the T. A. S. Sheridan Company. We find her foremost in the invasion of a field hitherto occupied exclusively by men, to which the telephone gives her access. Thirty years ago the superintendence of this business by a refined woman would have been impossible. Today the universal telephone equipment enables Mrs. Sheridan to manage her affairs with the same success that must have attended her husband in order to build up one of the largest lighterage and towing firms in New York City—and she goes no further than her office to do it! Thereby, time and effort are economized and biggest results obtained. Winds and tides are natural elements that have a direct bearing on the lighterage business. With the shifting of the wind or the changing of the tide a previous order must be quickly changed—and it is. The telephone at Mrs. Sheridan's elbow gives the key to the situation and in less than a minute she is talking directly with the captain in charge.

Another advantage is that even a 'longshoreman's vocabulary is likely to be circumspect to a lady over the wire.

The foregoing is but a simple forceful example of what the telephone is doing in the business world of today. What it will do in that of tomorrow it is not possible to say, but the past and the present give promise that the future will see its value marvelously increased.

MICHIGAN COMMISSION NEWS

The affairs of the Onaway-Alpena Telephone Company of Lansing, Mich., were aired before the Michigan Railroad Commission recently. The Onaway-Alpena Telephone Company was organized November, 1911, and took over the Alpena Mutual Company, the Onaway Telephone Company and the Otsego County Telephone Company, owned by Frank Caulkins of Gaylord. The railroad commission authorized the company to issue stock to extent of $1,000,000, but allowed it to sell only $180,000 at the time. The money derived was to be used to pay for the Onaway and Otsego companies. Some citizens allege that the company has not complied with the terms of the order regarding selling the stock, and that the $100,000 which was to be used in improving the service has not been so used. It also is alleged that the officials of the company explained their failure to act by claiming they were being held up by the commission. The commission ordered the company to appear and explain what had become of the money.

A Lot of Loaded Lines

The Song of the Wire

This is the song of the wire—
  Th' electric wire;
The slender thread with the soul of fire—
With the wings of light that shall never tire—
With a power and grandeur awful and dire—
This is the song of the wire,
  Th' electric wire:

Oh! I a mthe monarch of light and of dark —
The power of life and of death;
I can quicken your pulses or lay you stark,
By a touch of my fiery breath.
My life-blood is ether—the life of the world
  From pole unto pole—
The planets were spinning in harmony hurled
  At the birth of my soul.

For aeons of ages I slept in the earth,
Awaiting a master's call;
(The power in bondage is little worth,
And the sweets of idleness pall.)
But now I am singing and humming in glee—
  While Pluto doth quake!
Redemption is come—I am free! I am free!
  My heart is awake!

This is the song of the wire—
  Th' electric wire;
The slender thread with the soul of fire—
With the wings of light that shall never tire—
With a power and grandeur awful and dire—
This is the song of the wire,
  Th' electric wire.

BOREAS.

One reason, at least, why some independents sell out to the Bell: During a merger hearing before the Ohio Commission, the Bethel Telephone Company was asked who was in charge of the exchange. "Well," was the reply, "we have no regular operator. If anyone happens along and hears the bell ringing he sticks in the plug, if he knows how." Considerable service, we opine.

BUT WHY PUT THE WIRE IN THE WINE, OLD TOP?

[From the London *Electrician*.]

M. Moquenne, of Paris, suggests the following method of testing wine: Pass a telephone wire through a vat of wine. If the wine is pure the words of the speaker on the other end will be heard distinctly, while should the wine contain an acid the words will be indistinct.

The British trade papers are reporting the court case of Gott vs. Verity. Even the eternities are at outs in dear old England, it appears.

ZERO IN ERRATA.

[From the *Journal of U. S. Artillery*.]

Page 311: Errata.—Omit the erratum indicated for page 119 relative to the value of x, which should remain 16.018.

WE USES OURS TO POLISH THE DESK.

[Editorial in the Asheville, N. C., *Citizen*.]

Despite the fact that the telephone has been in general use for more than a quarter of a century, a large percentage of those who have the instrument at their elbows does not know how to use them.

P. H. W.

Consistent advertising is a guarantee of reliability. That is why a failing house generally rushes in and advertises beyond its means. Spending money shows you've got it to spend.

Rates in Cities of Over 10,000 Population

3. Number of Telephones Operated

SINCE the first and second articles of this series appeared in our November and December numbers, giving data on flat and measured rates in cities of over 10,000 population, we have had inquiries from many who desire information as to the number of telephones operated in these cities. This article, therefore, is arranged to supply that information in so far as it is available. To give the table maximum value for reference purposes, the single-line business and residence rates are repeated. For a more comprehensive study, the present table may be used in connection with the previous articles of the series.

Corrections and changes noted for the November article are as follows: New Bedford, Mass., no longer has a four-party business rate. The correct rates at present are: Business single line, $57.00; residence single line, $33.00; residence two-party line, $27.00; residence four-party line, $25.00. Lawrence, Mass., no longer has a two-party business rate. The other rates for Lawrence are correct as given in November.

In the present list, matters are occasionally complicated and a true estimate of the total number of telephones made difficult by pending consolidations. In Detroit, Mich., for example, the figure of 68,000 telephones in the system of the Michigan State Telephone company is as of August, 1912, and presumably does not take into account the absorption of the Detroit independent and the consequent addition of the independent list minus the duplications.

The Baltimore figure is based on information some eighteen months old. At that time the Maryland Telephone and Telegraph company was reported to be operating approximately 12,000 lines in Baltimore, making a total of 50,600 lines for the city. The Maryland company, however, was declared to be also Bell owned and operated.

The Buffalo figure given is for the independent company alone, no information being forthcoming as to the number of Bell stations.

San Francisco affords another example of recent consolidation. When the duplications are eliminated, the total may be materially changed.

Providence, R. I., has 24,184 telephones within its boundaries; but the rates quoted apply to a total of 41,142 in the so-called "metropolitan district" embraced by the Providence system.

The Central Union Telephone company's figure of 5,000 telephones in Akron, Ohio, is, of course, approximate. The Akron People's Telephone company claims a total of 5,117 instruments in use. This, however, includes extensions; the total number of subscribers is given as $4,850.

The Central Union company's figure of 8,000 in Springfield, Ill., also includes extensions. The net subscriber list is not quoted.

The Lincoln, Neb., figure does not take duplications into account but simply quotes the total number of telephones in the city November 1, 1912. Lincoln is to have a single service, that of the Lincoln Telephone company, independent, after January 1, 1913.

No report is made on the Home Telephone company of Flint, Mich., as it is stated to have practically ceased operating, with less than a dozen lines in the city.

Quincy, Ill., also has consolidated, and the total of 7,000 does not eliminate the duplications.

The two companies of Lexington, Ky., have agreed to consolidate, subject to the approval of the state commission.

The total for East Orange, N. J., is given as 8,937 telephones. That figure, however, includes Orange, East Orange and West Orange, with a total population of 74,980.

Colorado Springs' total of 7,000 instruments includes also Colorado City, Manitou, Ivywild and Broadmoor. The total population thus served is about 40,000.

Sometime after the first of the year the Wisconsin Telephone company will absorb the lines of the Valley Telephone company at Green Bay, Wis. There may, therefore, be a slight shrink in the total when duplications are stricken out.

In connection with the figure for Oak Park, Ill., it should be taken into consideration that it is a suburb of Chicago, and the home of Chicago business men. This would probably indicate a preponderance of residence telephones.

The total of 2,400 instruments in Great Falls, Mont., is partly estimated, as the work of consolidating the two systems is not yet completed.

The same condition is true at Plattsburgh, N. Y., and the figure given for that city includes duplications.

It has been the intention, in compiling this tabulation, to hold the number of telephones strictly to the comporate limits of each city listed. It should be remembered, however, that this does not always apply to the rates, which, in the smaller communities, often embrace the whole county. The population served at a given rate, as well as the number of telephones operated, may be larger than indicated in some cases.

City	Population	Company	No. Telephones Bell and Independent	No. Telephones Total	Single Line Rates—Business	Single Line Rates—Residence	Date of Information
New York, N. Y.	4,766,883	New York T. Co. (Bell)	512,000	512,000	Measured	Measured	Oct. 20, 1912
Chicago, Ill.	2,185,283	Chicago T. Co. (Bell)	303,000	.....	$125.00	$72.00	Nov. 30, 1912
Philadelphia, Pa.	1,549,008	Bell T. Co. of Penna	100,000	.....	Measured	60.00	May 1, 1911
Philadelphia, Pa.	.....	Keystone T. & T. Co. (Ind.)	28,000	128,000	.....	.....	May 1, 1911
St. Louis, Mo.	687,029	Pell Co. of Mo	43,000	.....	78.00	48.00	Nov. 27, 1912
St. Louis, Mo.	.....	Kinlock Home T. Co.	35,000	78,000	72.00	48.00	Nov. 27, 1912
Baltimore, Md.	558,485	Ches. & Potomac T. Co. (Bell)	*38,600	.....	.....	.....	May 1, 1911

City	Population	Company	No. Telephones Bell and Independent	No. Telephones Total	Single Line Rates—Business	Single Line Rates—Residence	Date of Information
Detroit, Mich.	465,766	Mich. State T. Co. (Bell)	*68,000	68,000	72.00	42.00	Aug. 1, 1912
Buffalo, N. Y.	423,715	Federal T. & T. Co. (Ind.)	*22,000	.....	72.00	36.00	Dec. 2, 1912
San Francisco, Cal.	416,912	Pacific T. & T. Co. (Bell)	*97,000	97,000	Measured	42.00	Nov. 29, 1912
Cincinnati, Ohio	364,463	Cin. & Suburban Bell T. Co.	45,000	45,000	100.00	60.00	May 1, 1911
New Orleans, La.	339,075	Cumberland T. & T. Co. (Bell)	19,945	19,945	102.00	54.00	Nov. 27, 1912
Washington, D. C.	331,069	Ches. & Potomac T. Co. (Bell)	46,571	46,571	Measured	48.00	Nov. 26, 1912
Los Angeles, Cal.	319,198	Pacific T. & T. Co. (Bell)	53,000	.....	63.00	27.00	Dec. 4, 1912
Los Angeles, Cal.	.....	Home T. Co. (Ind.)	51,000	104,000	63.00	27.00	Dec. 4, 1912
Seattle, Wash.	237,194	Pacific T. & T. Co. (Bell)	44,741	44,741	90.00	36.00	Nov. 30, 1912
Providence, R. I.	224,326	Providence T. Co. (Bell)	24,184	24,184	*80.00	*48.00	Nov. 23, 1912
Indianapolis, Ind.	233,650	Central Union T. Co. (Bell)	25,000	.....	54.00	24.00	Nov. 26, 1912
Indianapolis, Ind.	.....	Indianapolis T. Co. (Ind.)	15,000	40,000	54.00	24.00	Nov. 26, 1912
Louisville, Ky.	223,928	Cumberland T. & T. Co. (Bell)	10,110	.....	66.00	44.00	Nov. 26, 1912
Louisville, Ky.	.....	Louisville Home T. Co. (Ind.)	15,360	25,470	48.00	36.00	Nov. 26, 1912
St. Paul, Minn.	214,744	Northwestern T. Ex. (Bell)	22,000	.....	78.00	48.00	Nov. 29, 1912
St. Paul, Minn.	.....	Tri-State T. & T. Co. (Ind.)	15,000	37,000	48.00	30.00	Nov. 29, 1912
Portland, Ore.	207,214	Pacific T. & T. Co. (Bell)	37,004	37,004	96.00	36.00	July 24, 1912
New Haven, Conn.	133,605	S. New England T. Co. (Bell)	15,500	15,500	84.00	36.00	Nov. 30, 1912
Richmond, Va.	127,628	Ches. & Potomac (Bell)	16,000	16,000	72.00	36.00	Nov. 25, 1912
Omaha, Neb.	124,096	Neb. T. Co. (Bell)	28,500	28,500	84.00	36.00	Nov. 29, 1912
Spokane, Wash.	104,402	Pacific T. & T. Co. (Bell)	21,757	.....	72.00	36.00	Nov. 1, 1912
Spokane, Wash.	.....	Home T. Co. (Ind.)	4,267	26,024	48.00	24.00	Nov. 30, 1912
Bridgeport, Conn.	102,054	S. New England (Bell)	9,960	9,960	84.00	36.00	Nov. 27, 1912
Hartford, Conn.	98,915	S. New England (Bell)	14,600	14,600	84.00	36.00	Nov. 27, 1912
Trenton, N. J.	96,815	Del. & Atlantic T. Co. (Bell)	7,580	.....	60.00	30.00	July 1, 1911
Trenton, N. J.	.....	Interstate T. Co. (Ind.)	3,007	10,587	36.00	24.00	Aug. 19, 1911
Salt Lake City, Utah	92,777	Mountain States T. Co. (Bell)	16,965	16,965	78.00	36.00	Nov. 14. 1912
Springfield, Mass.	88,926	New England T. & T. Co. (Bell)	15,000	15,000	75.50	54.00	Nov. 29, 1912
Des Moines, Iowa	86,368	Iowa Tel. Co. (Bell)	17,000	17,000	60.00	30.00	Nov. 27, 1912
Lawrence, Mass.	85,892	New England T. Co. (Bell)	4,888	4,888	57.00	33.00	Nov. 25, 1912
Tacoma, Wash.	83,743	Pacific T. & T. Co. (Bell)	15,000	15,000	72.00	36.00	Nov. 30, 1912
Yonkers, N. Y.	79,803	New York, T. Co. (Bell)	4,610	4,610	90.00	36.00	Dec. 6, 1912
Erie, Pa.	66,525	Bell Co. of Penna.	3,200	.....	60.00	30.00	Nov. 29, 1912
Erie, Pa.	.....	Mutual T. Co. (Ind.)	5,200	8,400	40.00	28.00	Nov. 29, 1912
Akron, Ohio	69,067	Central Union (Bell)	5,000	.....	54.00	30.00	Nov. 29, 1912
Akron, Ohio	.....	Akron Peoples T. Co. (Ind.)	*5,117	10,117	42.00	30.00	Nov. 29, 1912
Oklahoma City, Okla.	64,205	Pioneer T. & T. Co. (Bell)	10,066	10,066	61.20	34.80	Nov. 25, 1912
South Bend, Ind.	53,684	Central Union (Bell)	4,800	.....	45.00	24.00	Nov. 30, 1912
South Bend, Ind.	.....	Home T. Co. (Ind.)	6,041	10,841	36.00	24.00	Nov. 30, 1912
Jacksonville, Fla.	57,699	S. Bell T. Co. (Bell)	9,000	9,000	60.00	30.00	Nov. 29. 1912
Springfield, Ill.	51,678	Central Union T. Co. (Bell)	*8,000	.....	48.00	30.00	Dec. 14, 1912
Springfield, Ill.	.....	Inter-State T. Co. (Ind.)	1,950	9,950	36.00	21.60	Dec. 14, 1912
Little Rock, Ark.	45,941	Southwestern T. & T. Co. (Bell)	8,000	8,000	48.00	27.00	Nov. 29, 1912
Malden, Mass.	44,404	New England T. & T. Co. (Bell)	2,940	2,940	60.00	36.00	Dec. 12, 1912
Lincoln, Neb.	43,973	Neb. Tel. Co. (Bell)	*12,992	12,922	48.00	24.00	Nov. 1, 1912
Lincoln, Neb.	.....	Lincoln T. Co. (Ind.)	*12,922	12,922	48.00	24.00	Nov. 1, 1912
Augusta, Ga.	41,040	S. Bell T. Co.	4,300	4,300	60.00	36.00	Dec. 4, 1912
San Diego, Cal.	39,578	Pacific T. & T. Co. (Bell)	7,518	.....	60.00	24.00	Dec. 3, 1912
San Diego, Cal.	.....	San Diego Home T. Co. (Ind.)	5,500	13,018	48.00	24.00	Dec. 3, 1912
Kalamazoo, Mich.	39,437	Mich. State T. Co. (Bell)	6,720	6,720	42.00	24.00	Nov. 26, 1912
Flint, Mich.	38,550	Mich State T. Co. (Bell)	3,600	3,600	36.00	24.00	Nov. 26, 1912
Racine, Wis.	38,002	Wis. T. Co. (Bell)	5,700	5,700	42.00	24.00	Nov. 26, 1912
Tampa, Fla.	37,782	Peninsular T. Co. (Ind.)	3,300	3,300	54.00	30.00	Nov. 30, 1912
Elmira, N. Y.	37,176	New York T. Co. (Bell)	3,340	.....	54.00	30.00	Nov. 27, 1912
Elmira, N. Y.	.....	York State T. Co. (Ind.)	2,240	5,580	48.00	30.00	Nov. 27, 1912
Quincy, Ill.	36,587	Central Union T. Co. (Bell)	3,500	.....	48.00	24.00	Nov. 29, 1912
Quincy, Ill.	.....	Home T. Co. (Ind.)	3,500	*7,000	48.00	24.00	Nov. 29, 1912
Springfield, Mo.	35,201	Bell T. Co. of Mo.	5,500	5,500	36.00	22.00	Nov. 25, 1912
Lexington, Ky.	35,099	Fayette Home T. Co. (Ind.)	3,500	.....	48.00	24.00	Dec. 2, 1912
Lexington, Ky.	.....	Cumberland T. & T. Co. (Bell)	1,500	5,000	48.00	24.00	Dec. 2, 1912
East Orange, N. J.	34,371	New York T. Co. (Bell)	*8,937	8,937	60.00	48.00	Dec. 6, 1912
Charlotte, N. C.	34,014	S. Bell T. Co.	4,000	4,000	40.00	24.00	Nov. 29, 1912
Cedar Rapids, Iowa	32,811	C. R. & Marion T. Co. (Bell)	6,396	6,396	36.00	24.00	Nov. 27, 1912
Joplin, Mo.	32,073	Bell T. Co. of Mo.	2,642	.....	30.00	24.00	Nov. 25, 1912
Joplin, Mo.	.....	Home T. Co. (Ind.)	2,800	5,442	30.00	24.00	Nov. 25, 1912
Lansing, Mich.	31,229	Citizens T. Co. (Ind.)	2,500	.....	30.00	20.00	Nov. 30, 1912
Lansing, Mich.	.....	Mich. State T. Co. (Bell)	2,400	4,900	30.00	20.00	Nov. 30, 1912
Decatur, Ill.	31,140	Central Union T. Co. (Bell)	4,900	.....	36.00	24.00	Nov. 29, 1912
Decatur, Ill.	.....	Automatic T. Co. (Ind.)	3,000	7,900	36.00	24.00	Nov. 29, 1912
Mount Vernon, N. Y.	30,919	New York T. Co. (Bell)	5,200	5,200	60.00	36.00	Nov. 25, 1912
Lima, Ohio	30,508	Lima T. Co. (Ind.)	4,967	.....	36.00	24.00	Nov. 28, 1912
Lima, Ohio	.....	Central Union T. Co. (Bell)	2,103	7,070	42.00	24.00	Nov. 28, 1912
Niagara Falls, N. Y.	30,445	New York T. Co. (Bell)	3,699	.....	72.00	36.00	Nov. 30, 1912
Niagara Falls, N. Y.	.....	Niagara County (Ind.)	2,200	5,899	36.00	15.00	Nov. 30, 1912
La Crosse, Wis.	30,417	La Crosse T. Co. (Ind.)	4,254	.....	36.00	24.00	Dec. 5, 1912
La Crosse, Wis.	.....	Wis. T. Co. (Bell)	1,659	5,914	36.00	24.00	Dec. 5, 1912
Pasadena, Cal.	30,291	Pacific T. & T. Co. (Bell)	11,000	11,000	48.00	30.00	Dec. 3, 1912
San Jose, Cal.	28,946	Pacific T. & T. Co. (Bell)	7,606	7,606	60.00	36.00	Dec. 6, 1912
Colorado Springs, Col.	29,078	Mountain States T. Co. (Bell)	*7,000	7,000	72.00	48.00	Dec. 5, 1912
New Rochelle, N. Y.	28,867	New York T. Co. (Bell)	4,274	4,274	60.00	36.00	Dec. 17, 1912
Danville, Ill.	27,871	Central Union T. Co. (Bell)	4,500	4,500	30.00	18.00	Dec. 3, 1912
Newburgh, N. Y.	27,805	New York T. Co. (Bell)	3,500	3,500	48.00	30.00	Dec. 2, 1912
Waterloo, Iowa	26,693	Corn Belt T. Co. (Bell)	5,500	5,500	36.00	24.00	Nov. 25, 1912

City	Population	Company	No. Telephones Bell and Independent	No. Telephones Total	Single Line Rates Business	Single Line Rates Residence	Date of Information
Newark, Ohio	25,404	Newark T. Co. (Ind.)	3,900	.....	30.00	21.00	Nov. 29, 1912
Newark, Ohio	.....	Central Union T. Co. (Bell)	1,400	5,300	36.00	18.00	Nov. 29, 1912
Green Bay, Wis.	25,236	Wis. Tel. Co. (Bell)	3,500	.....	42.00	24.00	Dec. 3, 1912
Green Bay, Wis.	.....	Valley T. Co. (Ind.)	*1,500	5,000	.....	.....	Dec. 3, 1912
Rock Island, Ill.	24,335	Central Union T. Co. (Bell)	3,815	3,815	60.00	36.00	Nov. 26, 1912
Petersburg, Va.	24,127	Petersburg T. Co. (Ind.)	1,700	1,700	48.00	30.00	Nov. 29, 1912
Gloversville, N. Y.	20,642	Glen T. Co. (Ind.)	2,900	2,900	42.00	30.00	Dec. 3, 1912
Oak Park, Ill.	19,444	Chicago T. Co. (Bell)	*5,100	5,100	48.00	36.00	Nov. 29, 1912
Tulsa, Okla.	18,182	Pioneer T. & T. Co. (Bell)	3,600	3,600	36.00	24.00	Dec. 4, 1912
Lockport, N. Y.	17,970	New York T. Co. (Bell)	2,158	.....	48.00	30.00	Nov. 29, 1912
Lockport, N. Y.	.....	Niagara County (Ind.)	668	2,826	36.00	24.00	Nov. 29, 1912
Austin, Texas	17,699	Southwestern T. & T. Co. (Bell)	4,109	.....	48.00	24.00	Nov. 30, 1912
Austin, Texas	.....	Independent T. Co.	2,350	6,459	36.00	24.00	Nov. 30, 1912
Great Falls, Mont.	13,948	Mountain States T. Co. (Bell)	*2,400	2,400	54.00	30.00	Dec. 17, 1912
Middletown, Ohio	13,152	Middletown, T. Co. (Bell)	2,202	2,202	36.00	18.00	Nov. 29, 1912
Shawnee, Okla.	12,474	Pioneer T. & T. Co. (Bell)	2,000	2,000	36.00	21.00	Nov. 29, 1912
Little Falls, N. Y.	12,273	New York T. Co. (Bell)	1,950	1,950	42.00	21.00	Nov. 29, 1912
Platttsburgh, N. Y.	11,138	New York T. Co. (Bell)	*1,600	1,600	30.00	18.00	Dec. 3, 1912
Columbia, Mo.	10,000	Columbia T. Co. (Ind.)	1,900	1,900	36.00	24.00	July 6, 1912

*See notes in body of article.

Measuring Telephone Circuit Equilibrium

By Bela Gati*

THE methods of measuring the insulation in direct current lines cannot be used for telephone circuits. The insulation measurements with high tension currents may be one thousand times smaller than that measured on direct current lines. It is therefore necessary to make measurements on telephone wires with a test wire having the same frequency as the telephone line, for the strength of the incoming current, as also the efficiency of the transmission line, depend only on the conditions found in the telephone circuit.

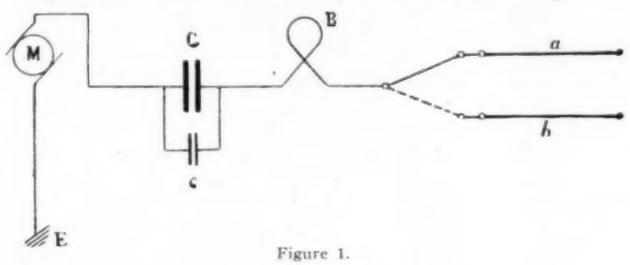


Figure 1.

Fig. 1 shows the instrument and the connections needed for measuring the insulation of the circuit. In this figure, *M* is the high frequency generator; *C* and *c* are condensers, which can be regulated, one for general adjusting, while the other is for precision and very accurate adjusting. *B* is an apparatus, called by the author a "barretter," a wire loop or bridge, as seen in the illustration. The current conductors are connected to the measuring instrument by means of an interrupter. We connect branch *a* to the instrument *B*, which seems to have about the same office as a Wheatstone bridge, first setting the instrument at zero, and we obtain a resonance effect in the circuit, by means of the condensers *C* and *c*, at the moment when the current is strongest. Then branch *b* is connected to the instrument. If the deflection of the galvanometer does not change, and if the resonance still exists, the current strength of branch *a* is equal to that of branch *b*, and the insulation effect in branch *a* is equal to that in branch *b*.

If the resonance is retained, but the maximum deflection of the galvanometer, in the case of the connection with branch *a*, is greater than that obtained when connecting with branch *b*, then the current strengths of both branches are equal, but the insulating effect of branch *b* is smaller than that of branch *a*. If the resonance cannot be maintained except by using the condensers in the circuit, the maximum deflections of the galvanometer will be equal, and the insulating effect of both branches will be equal, but the current strengths are not alike. If the resonance effect is lost, and the maximum deflections of the galvanometer are not equal, both the insulating effects as also the current strengths of the branches are different.

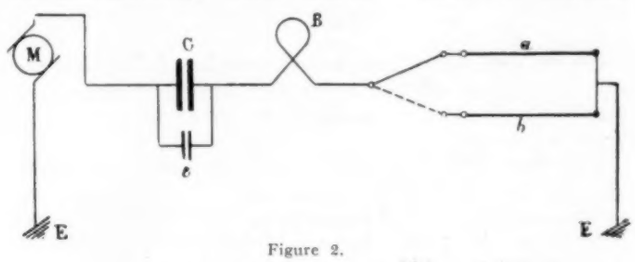


Figure 2.

When looping the current conductors, the measurement will give the self-inductance and the effective resistance instead of the current strength and insulation effect. Fig. 2 shows the apparatus arranged for measuring the self inductance and the resistance.

The method for making measurement is as follows: We connect branch *a* of the circuit, and obtain the resonance effect by the aid of the condensers *C* and *c* and adjust this until the galvanometer shows the maximum deflection. When we note down the extent of the deflection as also the readings or values of the

*Annals des Postes, Telegraphes et Telephones, Paris, translated for TELEPHONE ENGINEER.

condensers, we then connect branch *b* instead of branch *a*. If the resonance and the maximum deflections remain the same, both the self-inductances and the resistances of branches *a* and *b* are the same.

If the resonance of both branches persists, the condensers need not be used. If in the case of branch

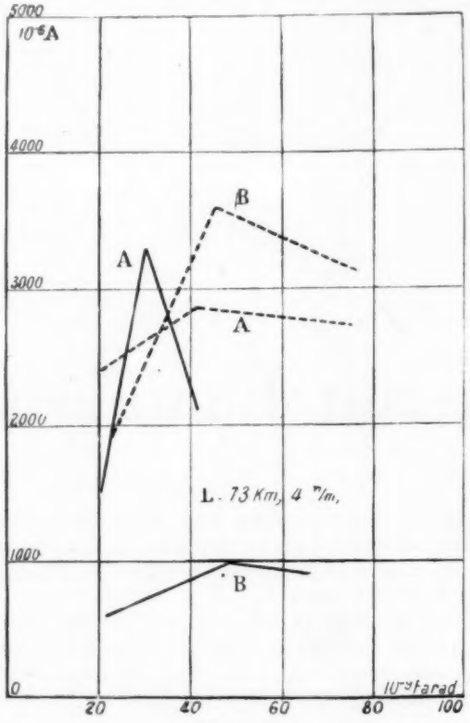


Figure 3.

b the galvanometer indicates a smaller deflection, the self-inductance effects in the two branches are equal, but the resistance of branch *b* is greater than that in branch *a*.

If the deflections of the galvanometer are equal, but we have to use the condensers to obtain the required resonance for branch *b*, the resistances are equal, but the self-inductances different. Finally, if it is necessary to use the condensers in both branches, and the readings on the galvanometer show different deflections for both, the inductances as also the resistances in both branches are different. In this way we can always control the conditions in the different circuits.

The measurement of self-inductance is very useful in those lines, especially where the self-inductance is artificially increased. It is to such lines that the following diagrams refer.

In both Figs. 3 and 4, the curves drawn for the insulating effect, as also for the current strength, are represented by dotted lines, while the curves for the resistance and self-inductance are shown by full lines.

The diagram shown in Fig. 3 is taken on a telephone line using Pupin coils in the circuit. As is seen, the curves of the two branches are quite different. In Fig. 4 the Pupin coils are short circuited, and as a result the curves are almost identical. In Fig. 3 the current strength curves are almost equal, but the insulating effects of the branches are different. The cause for the difference in self-inductance and resistance is probably due to the fact that the Pupin coils were mounted separately on the two wires and did not have a common core. Even if the self-inductances were equal at the start, they would probably change in the course of time. The change in self-inductance increases naturally, as does the resistance in any high tension line.

Using currents having the same frequency as telephone lines enables us to measure the faults in lines which would otherwise escape our attention. The utilization of this method for high tension currents is especially useful in long transmission lines. It is advisable to make these measurements in smaller sections of the line. It may be possible that the faults in a 500 km. line *a* are momentarily balanced by the faults in the 500 km. length of line *b*, so that we obtain a good equilibrium for these 1000 km. of line. But this equilibrium is not stable or lasting, and it is for this reason that it is better to measure by shorter lengths, as for example by 100 or 200 km. lengths. Since the efficiency of the circuit depends on the exact equilibrium in the lines, the greatest care should be used in making the measurements. The bolometric system "Gati" or "barretter," as the author calls it, can also be used for measuring the strengths of all kinds of high frequency currents. It allows the measurement of amplitudes from a few micro-amperes to one ampere. The test instrument is usually adjusted and used for telephone currents. Fig. 5 shows such

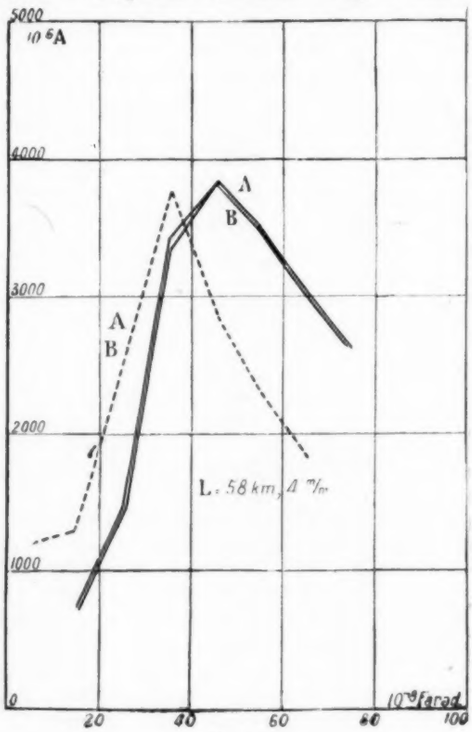


Figure 4.

an instrument with connections. *D-D* are choking coils, placed inside of the box used for the apparatus; *B-B* are the wire loops, or bridges as we might also call them (barretter). *A-A* are storage batteries, *G* is a galvanometer, *R-R* are resistances with sliding contacts. The resistance on the left is smaller than that on the right, and is used for general adjusting. The

second resistance, mounted in parallel with the left resistance, has a greater ohmic resistance and is used for very accurate and precise regulating. The two wire loops or bridges have the same resistance, and being instruments provided with plugs, can be easily adjusted.

The "barretters" or bridges have been chosen in units of two microns each (one micron=1000 micro-millimeters). The reason for this choice is found in the fact that with this unit a current passes over the bridge whose amplitude is the most favorable for a tension of 2.2 volts. The apparatus is then very sensitive and give the best results without necessitating a change in the tension.

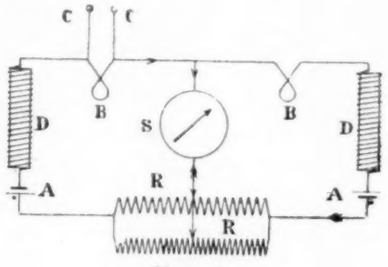


Figure 5.

Before measuring high frequency wires, it is necessary, however, first to adjust the measuring instruments. For this purpose, the differences between the two sections of the circuit must be balanced, so that the needle of the galvanometer, not using a shunt, should remain steady at 0. The circuit, whose current is to be measured, is then closed. It is of course always necessary in measuring high frequency currents to use a condenser connected in series with the circuit to be measured. Without this condenser, the equilibrium of the direct current in the apparatus would be destroyed, due to the changes in the external circuit.

New York Commission News

Permission has been given by the New York Public Service Commission, second district, for the consolidation of the Bell and independent telephone companies in the counties of Clinton, Essex, Franklin and St. Lawrence, with minor extensions into Warren and Washington counties under the title of the Mountain Home Telephone Company. The commission has authorized this company to increase its capital stock from $150,000 to $1,000,000, and to execute a mortgage to secure a maximum issue of $2,000,000 in 5 per cent bonds.

The Mountain Home Telephone Company is to issue presently $633,000 of capital stock, and $1,004,200 in bonds for the purchase of the property and business of the Adirondack Home Telephone, the Clinton Telephone and the New York Telephone Companies in the territory affected, and for the refunding of present outstanding bonds. A schedule of rates to be put into effect for one year has been filed with the commission, which reserves the right to reduce rates on proper complaint.

The territory affected extends east and west 126 miles, and north and south 85 miles. The area in square miles is 7,250, and the population is nearly 220,000. It runs from Plattsburg on the east to Ogdensburg on the west, and swings in a circle just above Glens Falls on the east and Watertown on the west.

The commission has directed its counsel to commence an action against the New York Telephone Company for failure to comply with the commission's order made on October 15, 1912, directing it to furnish telephone service to the Metropolitan Telegraph & Telephone Company in accordance with the demand of the Metropolitan company and upon the payment for such service one month in advance, and to place the name of the complainant among the subscribers in the usual manner in which subscribers' names are placed in the directory. On November 11 the commission denied the petition of the New York Telephone Company for a rehearing and the Metropolitan company now advises the commission that it has not been furnished with service nor listed in the directory.

The commission has adopted a set of regulations, effective on and after January 1, 1913, prescribing the form and governing the filing and publication of rate schedules of telephone corporations subject to its supervision. All such telephone corporations will be required to keep open for public inspection, and at all times during office hours readily accessible to the public, copies of all its schedules established and filed with the commission in its main and branch operating offices, also at each of its branch offices where contracts for service are made or payment for subscribers' service is received, and in each of its central operating offices copies of all of its established schedules of rates which apply within the area served by any such office and which apply as toll rates from any point within such area to any point outside such area and that upon request for inspection they shall be immediately produced and such production shall be accompanied by such assistance on the part of the proper representative of the telephone corporation having such schedules in charge as will enable the person examining to determine accurately the rate, rental or charge applicable to any particular kind of telephone service. The order further requires that the tariffs of all such telephone corporations must be printed, and prescribes the form; it directs that all schedules containing rates for local service must be reissued in the form prescribed by April 1, 1913, and that all joint tariffs containing toll rates must be reissued by August 1, 1913, and brought into conformity with the regulations.

Advice has been received by the commission from the Utica Home Telephone Company that on December 7, 1912, pursuant to authority from the commission, it sold and conveyed all its physical property and business to the New York Telephone Company for the sum of $250,000 and the assumption of the payment by the latter company of $463,100 par value of outstanding bonds of the Utica company.

The Adirondack company is authorized in the order to transfer the franchise granted by the village of Canton to the Mountain Home Company, and the New York Telephone Company is authorized to transfer certain local franchises to the Mountain Home Company. Negotiations have been had with the company and as a result a new schedule of rates has been submitted designed to meet recent objections raised by the commission. Under the new schedule of rates 196 subscribers to the Bell company will be increased an aggregate amount of $1,098 and that of the independent companies, 1,214 subscribers will be increased an aggregate of $7,189, making a total of 1,410 subscribers whose rates will be increased an aggregate of $8,287. The rate of 200 subscribers to the New York Telephone Company will be decreased $612.

The consolidation of the company will eliminate 689 duplications with an aggregate saving to the subscribers of $13,400 by reason of such eliminations. A total decrease for the entire territory, occasioned by decreases in rates and elimination of duplications will, therefore, for 889 subscribers accomplish a total saving of $14,012 as against an increase to 1,410 subscribers with an increase in amount of $8,287. The net annual saving to the subscribers in the territory will with offsets amount to $5,725. The authorization to increase capitalization is made upon the express condition that the Mountain Home company shall, before making any change in existing rates, file with the commission its proposed schedule of rates which shall not in any respect exceed the schedule heretofore submitted to the commission. The schedule so filed shall remain in force and effect for one year from the date of the filing of same.

The commission has authorized the Heuvelton Telephone Company to issue its common capital stock to the total par value of $14,000, the proceeds to be used for the acquisition of the telephone lines owned by Webster L. Wainwright at Heuvelton.

Two complaints have been received by the commission from residents of Shushan and Salem, Washington county, in reference to change in exchange areas of the Granville Telephone Company, whereby subscribers of these places are deprived of free service with each other. Since October first subscribers of these places have been charged five cents for calls between them. Complainants state that they secure no benefit by the rearrangement of territory giving them free service to Cambridge, but much prefer the former exchange areas providing free service between Shushan and Salem. These complaints have been served on the company and answers required within twenty days.

The commission has authorized the New York Telephone Company to put in effect January 1, 1913, new rates for general telephone service in Dunkirk city. The reductions in the annual rates will be for business direct line $12, two-party line $18, and for residence direct line $9, two-party line $6, four-party line $3. The rate for farmer lines served by such central office for residence service is reduced $3.

A. I. E. E. Resolutions on Patent System

The board of directors of the American Institute of Electrical Engineers adopted the following resolutions relating to the American patent system, November 8, 1912:

Whereas, there are pending before the Congress numerous bills affecting and greatly modifying the patent system in the United States, and

Whereas, the patent system has been, and is, a tremendous factor in building up the present industrial prosperity of this country, thereby greatly contributing to the prosperity of the country as a whole, and

Whereas, any untoward change in the patent situation might disastrously affect this condition of industrial and general prosperity, and the conditions contributing to their continual augmentation, and

Whereas, in view of the intimate relation of the patent system to the general welfare, no action looking toward any radical change in the patent system should be taken without most careful consideration, and

Whereas, in our opinion, proper consideration of such important changes as are proposed can be had only by an unbiased, non-partisan commission, made up of men from various walks of life and not from any one vocation, or interest,

Be It Resolved, that the American Institute of Electrical Engineers, acting through its officers and board of directors, respectfully urge the Congress of the United States that they provide for a commission, made up of unbiased, independent, non-partisan men of such national standing as will command the respect of the whole country and chosen from different walks of life; and not more than one from any one calling or interest and serving without pay. Such commission to hold public hearings, and otherwise, as may appear to them best, to make a thorough and careful study of the American patent situation, and to prepare and submit a comprehensive report and recommendations to Congress for such changes, if any, as may, as the result of their study, appear to them expedient, whether in the patent office, in the method of court procedure, or in the organic patent law, and recommendations as to the legislation they would propose for effecting said changes. And that we further respectfully urge that the Congress make ample provision for the expenses of said commission, and

Be It Resolved, that we respectfully urge the Congress of the United States to hold in abeyance all proposed legislation affecting the patent system in whatsoever way until such time as the said commission shall have had ample opportunity to hold the said hearings, and make the said study and report, and

Be It Further Resolved, that these resolutions be printed and a copy be sent to each senator and representative of the United States who is a member of the Senate and House Committee on Patents.

Telephone Value of Great Britain

Prof. D. C. Jackson, who has been engaged for the last two years in making a valuation of the telephone systems of Great Britain which are being taken over by the post-office department, arrived from Europe on the S. S. Mauretania, recently. Professor Jackson stated that although his work has not been finally completed, he expects that the total value of the telephone properties that are to be taken over by the government will be placed at between $50,000,000 and $60,000,000. He says that the figure that will be paid to the National Telephone Company which has been operating the telephone system abroad will probably be in the neighborhood of one of the amounts just mentioned. The National Company, he said, offered to sell its property and its assets to the government for $100,000,000, but no such price will eventually be paid for the properties.

Professor Jackson said that the gross earnings of the properties to be taken over by the government will approximate about $10,000,000 this year. It is expected by the government that the telephone properties will produce sufficient revenues to a little more than pay interest on the amount of money invested in the project. At the present time the government receives a royalty of 10 per cent of the gross revenues of the telephone company.

There is to be a readjustment of telephone rates as soon as the government assumes actual control of the system, which will probably result in a somewhat cheaper rate than now exists. At the present time the rates charged are £17 per annum flat rate for an unlimited number of calls, while the measured rate is £5 per annum with a charge of 1 penny (equal to 2 cents) per call for all messages over a certain number.

Oklahoma Commission News

On January 14, the Corporation Commission at Oklahoma City, will hear evidence upon a proposed order directed to all telephone companies, or combination of telephone and telegraph companies of whatever character in the state. It proposes that messages shall be routed via the line selected by the talker providing the line selected enters the telephone company's exchange, and providing the sender is willing to pay the price computed upon the route distance he selects.

Photographs Over a Telephone Wire

By Jacques Boyer*

A FRENCH physicist, M. Edouard Bélin, whose remarkable work in telephotography has been previously described, has invented a portable telephotographic apparatus. The new apparatus, remarkable for its small size and weight, constitutes a complete transmitting station, which can be connected up with a convenient telephone line in order to transmit pictures to a distant receiver.

In the so-called carbon process of photography, invented by Poitevin, photographic positives are made on paper coated with sensitive bichromated gelatine, which, as every one knows, becomes insoluble when exposed to light. When the print is taken from the printing frame, it is washed in hot water, the gelatine dissolving more or less, according to the variations in opacity in the negative. As a result the positive obtained consists of reliefs and depressions corresponding respectively with the whites and blacks of the original negative. The halftones lie intermediate between the maximum elevations and depressions.

Fig. 3.—A portrait transmitted by the improved Bélin telephotographic apparatus in four minutes over a telephone line of 450 miles.

The bichromate gelatin proof thus obtained is wrapped around the cylinder A of the portable telephotographic apparatus (Fig. 4), which is rotated by a powerful spring motor in the drum B. The spring, which can be wound up by means of a crank visible in the photograph, also drives through multiplying gears a governor R, the purpose of which is to maintain the speed of the cylinder's rotation at a contant number of revolutions. The cylinder's speed is also controlled by means of the graduated index immediately behind the pane of glass at the front of the apparatus. A milliampere-meter M is mounted to the left of the apparatus.

As the cylinder A rotates, a rheomicrophone C is made to travel parallel with it by means of a screw, the principle being much the same as that embodied in the Edison phonograph. The rheomicrophone C consists of a frame, box-like in form, the bottom of which consists of an insulated plate, and the cover of which is a flexible conducting sheet of carbon, serving the purpose of translating the variations in relief on the cylinder into currents of different intensity in the line. To carry out that purpose, resistances conveniently divided into ten stages are arranged on the insulated plate. The current from a small battery is received by the first resistance, always in contact with the conducting plate, and then flows through the wire attached to the last resistance. Depending upon the amount of pressure to which it is subjected, which pressure is governed by the hollows and elevations of the bichromated gelatin, the conducting plate bends more or less and touches a variable

*Scientific American

Fig. 1.—With the Bélin apparatus it is possible to transmit photographs over a telephone line to a distant receiving station.

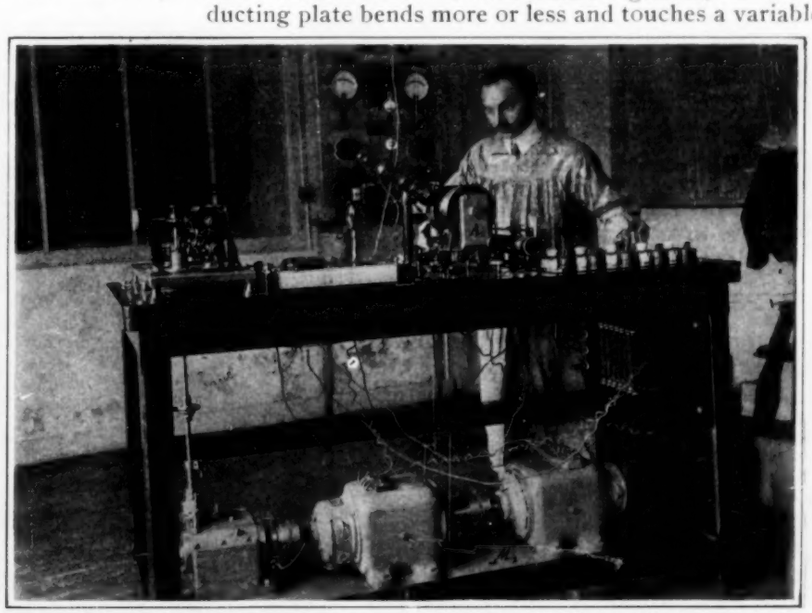


Fig. 2.—The receiving apparatus. A_1 is the oscillograph; B_1 is the photographic frame in which the receiving cylinder is held; C_1 is a lens combined with which is a series of screens; M_1 is an electric motor that drives the apparatus.

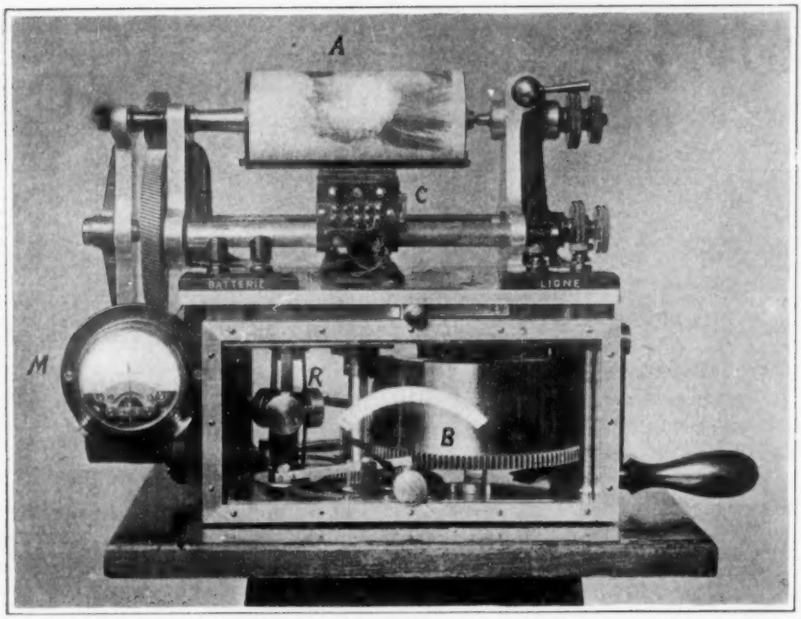


Fig. 4.—The improved Bélin telephotographic apparatus. A is the cylinder on which the original picture is wrapped; B is a drum inclosing a spring which drives the cylinder; C is a rheomicrophone; R is a governor that controls the speed of the cylinder.

number of resistances, the number increasing with the impulsive force received. Hence currents of successively different intensities are sent through the line. Microphonic contacts are employed in order to obtain better results in the transmission of photographs. It would require entirely too much space to describe in detail all the elements of this portable telephotographic apparatus. It may be stated, however, that perfect synchronism is obtained between the transmitting and receiving cylinders. For the purposes of this article we must proceed to a description of the manner in which the apparatus is utilized.

After the gelatine bichromate print has been wrapped around the cylinder, it is merely necessary to connect the apparatus with a telephone line. At the receiving station the telephone wires are connected with a large Bélin telephotographic apparatus, on the cylinder of which sensitized paper is wrapped on which the picture is to be received. The paper is protected by a hexagonal photographic frame.

All is now ready for the transmission of the photograph. The operators first exchange the necessary signals and synchronize their respective cylinders.

At the receiving station a Nernst lamp is employed as a luminous source. Its rays are projected on the sensitive surface, which is to receive the picture, by means of a Blondel oscillograph. The oscillograph consists of two large coils between which a mirror oscillates. The movements of the mirror are proportional to the intensity of the currents received. The pencil of rays emitted by the Nernst lamp is reflected in a little mirror; then the rays pass through a small aplanetic lens C_1 in connection with which the inventor uses a series of graduated screens that enable him to pass from complete transparency to complete obscurity. The receiving cylinder, which is identical in size with that of the transmitting station (Fig. 5), is driven by an electric motor M_1, mounted beneath the table on which most of the apparatus is carried. The motor is very carefully synchronized with that of the transmitter by means of a special rheostat. The cylinder of the receiver, indicated by B_1 in Fig. 2, and shown in detail in Fig. 5, is mounted in a wooden casing. This casing has a circular opening one third of a millimeter in diameter, through which the luminous rays enter. The walls of the casing are so designed that they will prevent reflections which might fog the picture. Since the elevations on the gelatine prints on the transmitting cylinder constantly displace the conducting plate of the rheomicrophone and the current that is sent through the line varies in intensity proportionally to the elevations and depressions of the original gelatine print, the mirror of the oscillograph in the receiving apparatus moves almost constantly. Because of the mirror's movement, the pencil luminous rays reflected is turned from right to left, from the center to the edge of the lens. It encounters the series of screens which reduce its luminous intensity more or less. On the other hand, since the sensitive film has been placed in the right position relatively to the mirror, the opening is continually illuminated. Hence, when the pencil of rays falls on the center of the lens, the absolute transparency of the interposed screen produces no extinction whatever. The luminous impression is a maximum, corresponding with a black portion on the original print. But if the luminous rays are reflected to the edge of the lens, the absolute opacity of the screen interposed causes a complete extinction of light and hence white is produced. For all the intermediate positions of the reflected bundle of rays, the scale of screens determines the corresponding halftones.

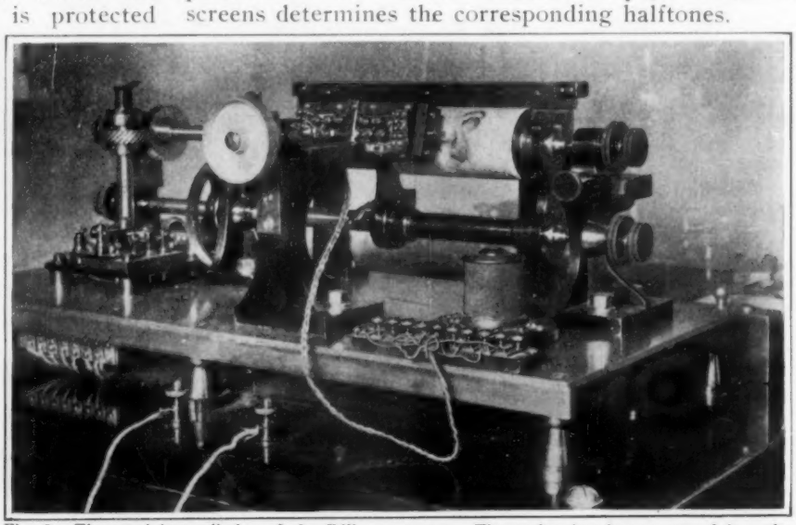


Fig. 5.—The receiving cylinder of the Bélin apparatus. The casing has been removed in order to show the picture that has been received.

The Lay of a Layman

By the T. E. Dopster

THERE is need for a department in this publication that will attempt to evade the technical aspect of telephony. That has been proven since the announcement of Sarah Elizabeth Brown's retirement. Protest after protest has come to us and only one sigh of relief. The majority in favor of the continuation of "What One Woman Thinks," or what she might be thinking, is overwhelming, but it can have no bearing on what she continues to think. She has left us.

* * *

But it doesn't follow that an attempt will not be made to indulge in the serious or frivolous subjects that bob up from time to time. And should they fail to bob, there is good reason to dive in and fetch them up. The telephone business would like very much to dawdle. It shows a tendency to expand without bursting any hoops. It isn't like a barrel of fermenting sauerkraut. And when it insists upon being staid and sober, there should be some rioting around the edges. The telephone business needs some tonic. It will never get it from the experts. That is proven whenever an expert sends in his report. Look at Bemis.

* * *

It is hardly probable that any man can slip on Sarah's slippers and feel comfortable in them. That is only one of several hundred thousand differences in the sex. Sarah and her old man played the role for three years and that's a good long time. They came in when Jack Kelsey went out and Jack is still at it—somewhat more rational than formerly, but nevertheless rampant. Jack plays the game like the last half inning with the score tied. He will always play it that way and it is right and proper that he should.

* * *

You can't review the telephone year. Had you thought of that? You hear the song of a nation's prosperity, but you read the telephone report of the A. T. & T. Company. There is a ripple of excitement down in the Alleghenies—somebody organizing a new national independent telephone association to compete with the old one. There isn't much else. Independent telephony has no historian. There are certain independents who were in at the beginning and because of that, prefer to remain, but they are not statisticians. They simply make a big noise that sounds like patriotism, and buy where they can get the most or the best, or both, for the smallest expenditure. Charley West was in Chicago a week or two ago, but he set up no new claims for the Pennsylvania attempt at reorganization of independents.

* * *

The final settlement has been made in the United States Independent Telephone Company litigation—that famous case that has agitated Rochester and St. Louis investors for a number of years. A million and a half of real money entered into the concluding transactions. The lawyers and receiver have been discharged. Nine hundred and seventy-five thousand dollars went to one hundred and eighty-four plaintiffs. Bondholders who joined the litigants recovered approximately fifty-six per cent of their original investment. Those who went into the reorganization scheme fared better, drawing down nearly ninety per cent of their total outlay. The recipients of these checks figure that it is all velvet. There was a time when the claims meant nothing. One of the Rochester papers sums it up by saying: "It is said that the prominent men who contributed to the million and a half settlement are quite as pleased as the recipients of the money. It is a soberly cheerful occasion all around."

* * *

As long as the world goes 'round, my friend, we'll hear of telephone strife; a single system in the end will mean to bare the knife. With dual service for our use, we'll have no peace of mind; there's sure to be something running loose with anything of the kind, for people are easily swayed about—they fall for agitation and kick and jam and rant and shout and act like Carrie Nation. So up and to it and at it, men, let's kindle up the fire and do it over and over again before we tune our lyre.

* * *

There will be a convention of telephone men at the Hotel LaSalle, February 18-19-20. It will be under the auspices of the original and only National Independent Telephone Association. Advance notices are not unlike those that you have seen before. The clans will gather and the old faces will show up in the corridors and among the exhibits. If you come, bring along an extra ten-spot for the banquet, for the committee will be around with a pack of pasteboards, numbered on the upper right-hand corner in red ink, and they'll get you sure. The banquets have been fixtures ever since the good old days when the manufacturer of apparatus paid the bills and told you to bring a friend along. And in those good old days nobody was particular whether you used his shirt front for a register or not. They were for a good time. Since then, however, independents attend conventions to find out how some fellows were able to get the maximum figure. They look over the line of exhibits; reminisce; discover that the increased cost of liquids is largely a myth and that the fixtures have improved. If they buy apparatus it is of necessity, rather than habit or choice. Let us hope that the next assembly will produce a Moses to lead the children to safety.

* * *

Contemplating the impending event, why not make it an independent telephony boost? You know there isn't a thing the matter with the business. If you have a complaint of any kind, drop it into the question box and when it comes out, rise like a man and answer it. For it's a ten to one shot you're the answer!

* * *

The Missouri and Kansas Telephone Company has acquired the Home Company at St. Joseph, Missouri; has full consent of the council to readjust the rates upward, and both the parties to the agreement seem to be pleased. There you are again—lots of telephones that formerly served through two operators now become one—and a slight increase to the public. Anybody hurt?

In all probability the legislative solons of Illinois will favor a law creating a Public Utility Commission. Public sentiment seems to be demanding such action and public sentiment always prevails. Illinois is a laggard in seeking such benefit. States all around us have public commissioners—good, bad and worse. Wisconsin leads. Ohio has a good law and a fairly good commission, but it gets nowhere, because a foolish legislature failed to provide operating appropriations. The Iowa law is bad in many respects, chief of which is limiting the franchise life. The public and the utility corporation are partners in all cases. The public grants the franchise—the corporation builds and operates the plant. Large investment will not follow the short-term franchise. It must have a stable foundation. The public, after all, makes the corporation possible. The corporation isn't the mint. It must show an attractive proposition before it can sell stock and bonds. It cannot make its proposal good on anything other than indeterminable franchises which protect customers and company. It is argued that the power should be vested jointly by the state and the municipality. This will give commissioners a dignity beyond the honor which politics or appointment usually bestows, and require a type of public servant whose qualifications cannot be questioned. In the manipulation of big problems, there is real danger that big men may be forced into the public service. Let us hope.

* * *

Elmira, N. Y., proposes to fight telephone merger. The Bell Company is taking over the York State Telephone Company's franchise and the citizens object. How do you think it will end?

* * *

To simplify the operations of the Bell companies in the southwest, the Southwestern Telegraph and Telephone Company, capitalized at $40,000,000, will take over the properties of the Missouri and Kansas Telephone Company, the Southwestern Telephone Company and the Bell Telephone Company of Missouri. The new organization will have its headquarters at St. Louis, and will operate the Bell system in portions of Illinois, Missouri, all of Arkansas and Texas and other southwestern territory. This nearly completes the Bell reorganized operating units.

* * *

This is being written at the conclusion of a very active year in which Telephone Engineer has made constant upward progress. We are indeed thankful to our friends in the trade for their help that has resulted in this satisfactory manner. It has been our notion that Telephone Engineer should be larger—twenty-five to fifty per cent larger—but we cannot achieve this result until the advertising section will carry its full share of the increased cost. This increased cost subject hits a publisher broadside, both in his business and at his home. Since Telephone Engineer was established the element of printer's wage has had two upward adjustments and the paper itself goes skyrocketing on any provocation. In starting, we established a subscription rate of $2 a year. The paper had thirty-two pages and a cover. Today we give you eighty pages and still put a cover on the book. There has been no change in the subscription price. We got as much for our advertising when Telephone Engineer was a baby as we do now, when it is a healthy child, but the advertiser got less then than he does now! But we had fewer advertisers. However, the fact that Telephone Engineer serves; that the publisher is established and that the publication grows, is largely due to the splendid co-operation we have enjoyed from the telephone field. A happy and prosperous new year is our best wish to all.

Ohio Commission News

Acting upon its own initiative after an investigation, the Ohio Public Service Commission made an order directing the Putnam Telephone Company of Ottawa to make extensive improvements and repairs by March 1, 1913. The action of the commission followed many informal complaints about poor service.

After having been refused permission a year ago to sell its property at Delaware and vicinity to the Delaware Citizens' Telephone Company, because the proposed price, $15,000, was declared by the public utilities commission to be too high, the Central Union Company has been authorized to consummate the transaction at a reduced valuation. The new price is $9,065.27. The property includes the exchanges at Delaware and Radner.

Authority has been granted by the Ohio Public Service Commission for the sale of the telephone property of the Central Union Telephone Company at Defiance, Ohio, to the Northwestern Telephone Company. A contract for interchange of service was also approved.

The commission has granted the application of the Oil Belt Telephone Company for authority to purchase the plants of the Central Union Telephone Company at Cygnet, Bloomdale and Jersey City, in Wood County. It was stipulated that the price paid should be $13,000. At the same time the commission gave the Oil Belt Company permission to issue $2,000 of preferred stock to make the necessary improvements and to issue $19,000 in notes running from one to 10 years to cover the cost of purchase and to retire $6,000 of bonds now due.

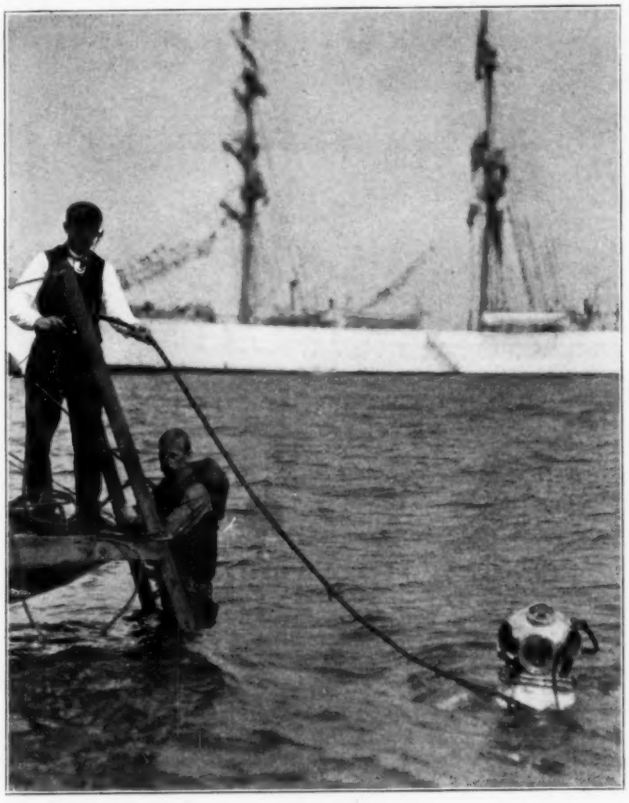
New Jersey Commission News

The Board of Public Utility Commission of New Jersey has denied an application of the Trenton Chamber of Commerce for suspension of a proposed increase of fifty cents per month in the charge for residence service by the Delaware and Atlantic Telegraph and Telephone Company. In ruling on this matter the board states that the ordinary application made to the board for the suspension of increased rates comes to the board without any specific knowledge on its part of the particular circumstances under which the increase is made. The board has been for some time investigating the rates charged by the Delaware and Atlantic Telegraph and Telephone Company in the City of Camden. The proposed increase in Trenton will result in equalizing Trenton rates with those of Atlantic City and Camden. The board states that the evidence in the Camden case is sufficient to rebut the presumption which ordinarily would exist in favor of the established rate in Trenton. The increase is declared to be *prima facie* in the nature if eliminating discriminatory and preferential rates for the Trenton area. At a recent hearing before the board it was agreed by the Trenton Chamber of Commerce that it would not push its complaint as to the reasonableness of the Trenton rates until after the decision of the board on the reasonableness of the rate charged in Camden.

The Telephone Scrap Book

Diving Apparatus Equipped With Telephone

THE accompanying illustration shows an unique self-contained diving apparatus designed and constructed at Lubeck, Germany, equipped with the telephone receiver and transmitter and communicating cable. The pressure tanks for the oxygen and air supply and the



Diving Suit with Telephone. Note the Head Receiver and Breast Transmitter Worn by the Man on the Boat.

self-contained breathing device are in a compact case mounted on the diver's back.

This self-contained German diving apparatus is utilized for depths of water up to 20 meters and supplies fresh air to the diver for periods of two to three hours. The telephone equipment is connected with the head piece by means of a flexible cable 60 meters long, payed out from a reel on the boat or dock, which makes it possible for the diver to be in constant communication with his assistants above the surface or those in charge of the work. The total weight of the apparatus without telephone is 190 kilograms and 240 kilograms with the telephone transmitter, receiver and auxiliary apparatus.

The accompanying illustration shows a diver provided with this German diving apparatus getting ready for a descent to a depth of 20 meters in Lubeck Bay in the Baltic Sea. This equipment was utilized by a diver to descend to about 70 feet below the surface to inspect the salt water intake of the electric power plant of the city of Lubeck, Germany.

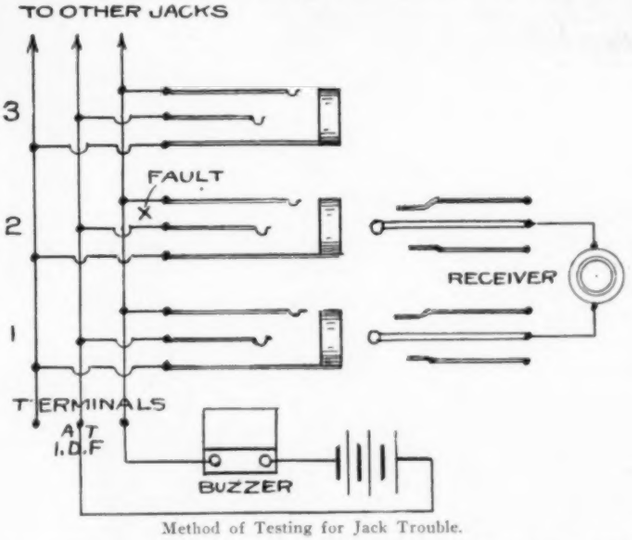
To Locate Trouble in Multiple Jacks

THE idea is to locate the jack the trouble is in so it will only be necessary to take out one jack. Trouble of this kind is usually caused either by the soldering tips being bent together, or a piece of solder getting between the clips, or by a faulty bushing or a small piece of metal spanning the bushing. Sometimes this forms carbon and makes a high resistance cross or what we term a spooky one—one that comes and goes. The method shown here, with a little variation and judgment, gets them all, according to the wire chief of the United Telephone Company, Ottawa, Illinois.

Connect a buzzer as shown across the terminals at the intermediate distributing frame so as to cause the buzzer circuit to be complete through the fault. If the resistance of the fault is too high to buzz through, put generator across it through a 16 c. p. lamp and burn the trouble in or use more battery on the buzzer. Sometimes the generator burns the trouble out and it will stay out. If it comes back go to it again. Use generator as a last resort.

Now by taking an extremely low wound receiver as per drawing, and connecting its terminals to the tip strands of two tinsel cords and starting with the first two jacks as shown in the drawing, a tone will be heard in the receiver until the faulty jack is passed. As shown in drawing, if the fault was in jack *2* the tone would be heard when the plugs were in jack *1* and jack *2*, but if the plugs be put in jack *2* and jack *3* the tone would not be heard because the receiver then would be on a part of the wire through which no current would flow.

There are numerous ways of locating this kind of



Method of Testing for Jack Trouble.

trouble, but most of them involve either a Wheatstone bridge or a galvanometer or a lot of work. The material used for this work costs very little. A low wound receiver should not cost over $3.50 and a buzzer and cords and batteries can be found around any exchange. It takes only a few moments to get ready for the test and the faulty jack is very easily and quickly located.

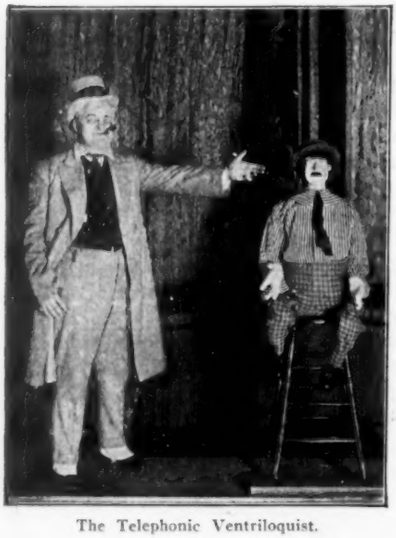
Tinsel cords should be used, as their resistance is lower than steel cords, or if small lamp cord is used the efficiency is increased.

Whenever the sleeve wire is involved in the trouble always put the receiver terminals on the sleeve strands of the tinsel cords as the sleeve strands are always of lower resistance.

The buzzer should be adjusted loosely so it will buzz through a high resistance. It is not necessary that the buzzer produce a good buzz but just open and close the circuit.

Another Phase of the Telephone's Versatility

ANYONE who can stand the glare of the foot-lights without experiencing stage fright can now become a full-fledged ventriloquist without previous practice in the art. This was proven to the amusement and astonishment of a large audience on the occasion of the recent Telephone Pioneer's convention in New York City at the entertainment given in honor of the Pioneers in the grand ballroom of the Hotel Astor on the evening of November 14.



The Telephonic Ventriloquist.

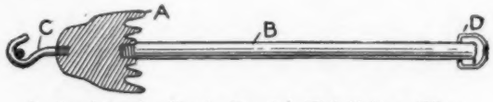
The entertainment, which was presented by the New York Telephone Society and participated in by members of the American Telephone, New York telephone and Western Electric Companies was a satirical musical hodge-podge entitled "Examinations," a travesty of an examining board inviting applications for positions at the telephone business. The part of the Western Electric Company was portrayed by W. D. Lindsey, of its advertising department, who was assisted by a wooden dummy designated as "The Very Latest Product of the Factory."

The dummy not only talked well but moved his arms, head and jaws in such a manner that the act seemed to be a perfect marvel of ventriloquism. What no one suspected, however, was the fact that concealed ingeniously in the body of the dummy was a Western Electric "loud-speaking telephone," which was connected to a transmitter behind the scenes by means of wires running down the feet of the chair to contact sockets on the floor of the stage. The telephone end of the "ventriloquial" conversation was conducted by P. M. Rainey, the designer of the dummy, and a further feature of the act was the rendering of songs by means of a phonographic attachment.

This very unusual use for a telephone instrument is but another illustration of the remarkable commercial versatility of the new loud-speaking telephones which have already proven their worth as announcers in railroad terminals, base ball parks and exhibition halls. There are, and probably will be found, many more fields of activity, for these remarkable products of the telephone engineer's art, both in and out of the theater.

An Insulated Line Hook

A DEVICE that I have found very handy in clearing trouble on high-voltage wires is shown in the accompanying sketch, says A. D. Capell in *Popular Mechanics*. The old way of clearing trouble is to throw a hand line over the wire and tie it away until it is more convenient to properly insulate the wire. This, however, is a dangerous practice, for the rope is liable to be burnt off if it gets wet.



An Insulator for Use in Drawing High-Voltage Wires.

My device enables a man to catch the wire with the hooked end and pull it away without any danger of a shock; and a small line fastened in the ring at the other end may be used to tie the tool to any convenient limb. If rain should occur, the insulation will keep the current away from the rope. The handle can be removed and the insulation carried in the pocket and kept dry until needed.

The device consists of a threaded composition insulator, *A*, such as is used for hanging arc lamps and on street-light brackets. A wooden handle, *B*, about eighteen inches long—a piece of broom handle will do—with a piece of pipe fitted on one end is screwed into the bottom of the insulator. A metal hook, *C*, is threaded to fit the top of the insulator. The ring *D*, in the end of the handle, is provided for attaching a rope, when it is desired to leave the device in use for any length of time.

Compressed Air for Testing and Drying Cables

SEVERAL years ago in Chicago three or four very puzzling cases of cable trouble developed, says B. V. Hill in the *Bell Telephone News*. Water was found in sleeves, which were apparently sound in every way, and it was impossible to find how the water could have entered. Finally dry air at a pressure of fifty or sixty pounds was forced into these cables while the solution of soap containing a little glycerine was spread over the outside of the wiped joints and several cases were found where the air would bubble right through the wiped joint. This was found to be due to the splicer's having mixed too much lead with his "half and half" solder, making what the men know as too coarse a solder. This difficulty was at once corrected. It is not the purpose here to discuss the matter of solder, but rather to describe the construction and operation of the air compressing outfit, which was developed in this connection, and which has been used with great success for testing cables for porous solder or possible defects in the armor, as well as for drying out sections of cable which had accidentally become wet.

The apparatus is mounted on a wagon ready to be taken wherever it may be needed. The engine, the compressor and the drying and cooling tanks are on a heavy platform so that they may be taken bodily in and out of the wagon. There is also a barrel containing the

cooling water for the engine, a hose for filling this barrel from a hydrant and a pressure hose for conducting the air from the compressor to the cable.

The figure shows the diagram of connections. A two-cylinder gasoline engine drives the air compressor. From the compression cylinder the air passes through a lead coil, which is immersed in a wooden tank containing water, or in winter, snow. The air comes from the compressor hot and saturated with moisture. A large percentage of this moisture is condensed in the lead coil. At the bottom of the lead coil is a pet-cock, which is left slightly open so that the condensed moisture may be blown out. From the lead coil the air passes into a reservoir on which there is a pressure gauge and from the reservoir, by way of a three-way cock to a drying tank. This tank is made of a piece of six-inch gas pipe, containing about nine gallons and filled with coarse granular calcium chloride. A plug of cotton waste is put in the end of this tank farthest from the compressor to prevent the calcium chloride from being driven out of the tank into the connecting pipes. From this calcium chloride tank a pipe leads to another smaller reservoir, also made of six-inch gas pipe. At one cap of this last reservoir a hole about two inches in diameter has been bored and a piece of plate-glass cemented against this end of the cap with plaster of paris. Against this glass window is fastened a small

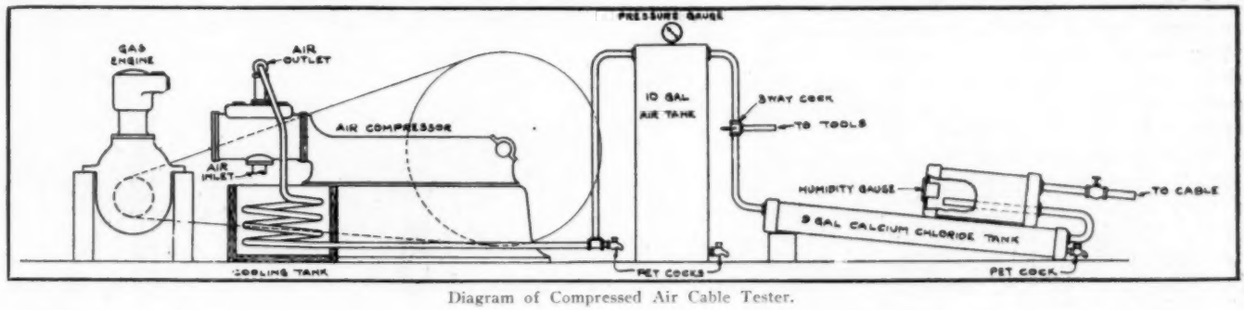


Diagram of Compressed Air Cable Tester.

hygrometer such as cigar merchants put in their showcases to indicate the humidity of the air in the case. The pipe from the drying tank passes through the small reservoir to a point directly under the hygrometer so that the air must pass over the hygrometer. In this way the humidity of the air which is being forced into the cable can be watched, and if it rises above about thirty per cent the calcium chloride in the drying tank is renewed. From the last small reservoir the air is led through a piece of pressure hose to the cable under examination. The hose is attached to the cable sheath usually by means of a piece of a twenty-five-pair cable armor which is wired into the pressure hose at one end and sweated onto the cable armor at the other, a hole about an eighth of an inch in diameter having been made in the armor. If it is desired to use the compressor to drive tools the air is taken from the three-way cock so that the calcium chloride in the drying tank is not wasted. A pressure of fifty or sixty pounds at the machine is generally employed. In this way a pressure of four pounds has been obtained three miles away from the compressor after about three hours' pumping.

This apparatus has been used very successfully for a variety of purposes. In the first place it was employed to test wiped solder joints to find whether too coarse a solder had been used. During the course of the first day a hole was found in the armor of a 300-pair nineteen-gauge cable at a point where the cable had been under water for a number of days. The sleeve was removed from the splice just beyond the hole and the air forced into the other end of the wet section, about 700 feet away. After about eight hours' pumping the insulation resistance of the cable had been raised to about 3,000 megohms per mile. In another instance a cable under the river had been maliciously sawed off and its end allowed to drop under the surface of the water. This section was also dried by means of the compresser air. Both of these were extreme cases, but in both the cost of drying cable in this way was very considerably less than the expense of replacing the wet section would have been. At another time two sections of an important toll cable were not only held in service, but entirely dried out, only one line having been out of service.

If a working cable has been wet for a number of hours with "battery" on some of the lines electrolytic action may have taken place and impregnated the paper insulation to some extent with copper salts. In such a case it may be impossible to bring up the insulation of the cable. In our experience in the city of Chicago, however, we have found but one case of this kind.

In a few cases of trunk cables the insulation was found below standard though not low enough to permit of a location of the fault being made with a bridge. Compressed air was put into the cable and the sheath examined from vault to vault until the defect was found. The air will, of course, seek out the most minute hole or crack, which would otherwise escape detection altogether.

Altogether the use of compressed air has proved itself a very efficient trouble saver and has very considerably reduced maintenance expense in cases where it has been used.

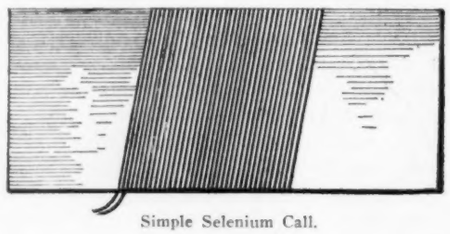
Method of Making Selenium Cells

SELENIUM can now be obtained in fused sticks or plates at about seventy-five cents an ounce. It is prepared from compounds of selenium which are found in the dust from furnace flues where sulphides are burned in the manufacture of sulphuric acid. This is oxidized to selenious acid, which is treated with sulphurous acid to give selenium. It thus forms a valuable by-product of what was once thrown away as useless.

Selenium exists in two allotropic forms, a red amorphous powder obtained as above and a dark gray mass obtained by melting and suddenly cooling this red powder. In addition to these, crystalline forms are obtainable by heating the gray solid form of selenium in

semi-inclosed vessels with varying amounts of air. These are usually either white or pink. They may be obtained by heating a portion of the gray solid selenium in an evaporating dish, covering or partially covering the dish with a clear piece of glass. Care must be taken or else the glass plate will crack. The crystals form on the glass plate. By varying the opening and supply of air different effects are produced. The red poisonous fumes which arise from the melting selenium are an oxide of selenium, which may be collected by holding a glass plate at some distance from the evaporating dish, where the vapor condenses on the glass plate. Little gray-black globules of selenium collect on the inside of the evaporating dish.

Chemically, selenium acts very much like sulphur.



Simple Selenium Call.

Heat is necessary for nearly all its actions with other elements. It has a very strong affinity for lead, tin, and zinc, and when a little of either of these metals is thrown on some melted selenium, some pretty fireworks take place and a selenide of the metal is formed. None of the acids acts very energetically upon selenium. The gray solid form is insoluble in carbon disulphide, but the amorphous form is soluble in it.

The gray solid form is the only one which is suited for electrical use. As it comes in sticks or plates it has a very high resistance, and is indeed almost an insulator. This is not so strange when we consider its close relation to stick sulphur, sulphur being one of the very best insulators known. Indeed, it was discovered that the resistance of selenium varied with the light to which it was subjected, while it was being used as a resistance for telegraph work.

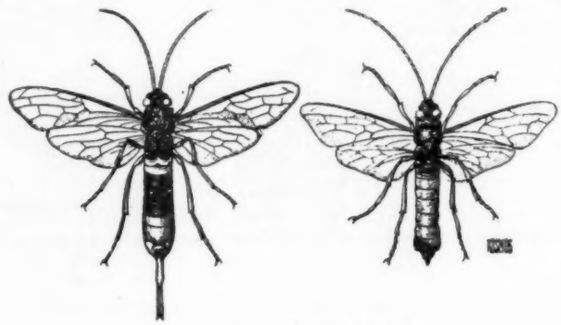
The essential points in a selenium cell all hinge upon obtaining a very thin film of selenium on some closely adjacent conducting wires. After countless futile trials the cell shown in the drawing was constructed, says Philip Edelman in the *Scientific American*. Its dimensions were 1 inch by ½.

A piece of clear mica ½ inch wide and 1 inch long is cut out, and beginning ¼ inch from one end two separate enameled copper wires are closely wound until within ¼ inch of the other end. The writer uses No. 40 enameled wire for this purpose, although No. 24 B. & S. enameled wire has been used successfully in the same way. The enamel is then very carefully scraped off the copper wire by means of a very fine jeweler's file until the metal shines through. This grid is now placed on a spoon or other holder and heated. When heated some selenium is quickly and evenly rubbed on it from a stick of selenium. Since the selenium melts and flows like sealing wax this part is not difficult. The grid is then quickly placed on a smooth flat surface and a small piece of clear glass ½ by 1 inch pressed down upon it with heavy pressure. This method insures a very thin film of selenium, which will adhere permanently to the grid. It should be so thin that it is semi-transparent. The glass piece is left on the grid permanently. The cell is then placed in an oven where it is allowed to bake at an even temperature just below the melting point, for several hours. It should then be taken out and suddenly cooled. The whole operation is a delicate process, but once mastered the making of the cells is simple. Connection is made to the ends of the two fine wires. The cell should be mounted so that the light can reach it from all sides.

The cell when constructed will still have considerable resistance, so a battery of a number of cells will be necessary. When proper pains and care are taken a cell sensitive enough for all ordinary experiments will be the result.

Insects Which Devour Metal

EVERY one is familiar with the disfiguring tracks or burrows left by various insects or larvæ in "worm-eaten" wood. It is not so well known that certain species, more especially the wood wasp (*sirex gigos*) will not only burrow their way through wood, but are by no means stopped even by metal, such as sheet lead and even harder materials. Some astonishing examples of this activity of the wood wasps are cited in the publications of the Paris Academy of Science, and quoted in a recent number of *Kosmos*. Our illustration shows specimens of the wood wasp, which readily bores through a lead-covered cable with circular holes. Still more astonishing is an instance on record, in which a packet of cartridges during the Crimean war was found perforated through and through by the larvæ of an allied species of wasp, technically known as *sirex juvencus*. In another similar case larvæ had pierced both the cartridge covers and lead balls. The lead plates of roofs and of sulphuric acid lead chambers have been found similarly perforated. Thus the occurrence can hardly be regarded even as particularly rare.



A Bug That Eats Lead Cables.

Guarantees Old Maids to "Stick"

The exchange at Petoskey, Michigan, is facing the problem of how to keep its operators. Every month one of the operators gets married, and there is no telling how many of those now busy at the boards have been spoken for.

A Grand Rapids merchant has written suggesting that old maids be employed, and he declares he has a good supply of them in his office. Something has to be done here to keep the supply of operators, and it may be necessary to refuse employment to anyone who is not homely enough to stop the office clock.

State Utilities Control vs. Municipal

By William J. Hagenah*

NECESSITY for state control of public utilities is emphasized by the relationship between the making of rates and taxation. For either purpose the property of a corporation must be valued. In those states which have followed a progressive policy with respect to these problems we see state tax commissions or boards of assessment working side by side with the public service commissions, each profiting by the data collected and the expert assistants of the other. This condition is destined to remove the tendency of the cities to claim a high value for purposes of taxation but a low value when the making of rates is in issue. The cooperation of public departments cannot be realized for any great length of time where the taxing and rate-making powers are exercised by two distinct and widely separated political units, each responsible to a different authority. State commissions are continuing bodies with a line of precedents to consider, not unlike those of a court, while the policy determining branch of our city governments generally changes every two or four years.

The physical conditions of our public utilities make local regulation impractical. Many utilities have been wisely brought under one management in the interest of economy. Especially is this true in the western states where service is transmitted over long distances from a central station. It is not difficult to find instances of as many as thirty or even fifty communities being served by a single company from one system, which often extends into two or more states and through a large number of cities and villages. Obviously, every city receiving service from such a system must be charged with its proper proportion of the value of the system, but it is difficult to understand how a score or more cities, acting independently as they must, could properly assign these values to the satisfaction of each. One can imagine conditions of municipal regulation of such a corporation where in time cities might claim a large interest in the transmission system for purposes of taxation, but deny such interest when the question of rates was in issue. The same condition could arise with respect to water companies which are frequently compelled to go long distances to mountain streams or lakes for an adequate supply of wholesome water, or could disturb the street railway system of any large city which is nearly always interurban in character. Not many years ago cities sought to regulate railroad terminals. Today the error of such a course is generally understood and the facts which brought about state regulation of interstate carriers apply with equal force to state regulation of all public service corporations.

It would be impossible for municipalities to maintain an organization skilled in public utility matters. Aside from a very few large cities, there are none which possess conditions requiring a permanent organization. While a particular service might require an extended investigation at any time, for which purpose a large and expensive staff would be required, this organization would not be necessary after the disposition of the case. It would be extremely difficult to build up such a staff in a short time and unless constantly employed it could not be maintained. Unless regulation is predicated upon thorough invstigation, there is grave danger of the issues in the case becoming more or less involved with considerations other than those warranted solely by the facts. A city commission could not obtain comparative information from other companies and compel the opening of their books and records, nor could it prescribe a proper uniform system of accounts and cost analysis. Under such a method not only would the utilities of every city be compelled to deal with a separate regulating authority following different lines of thought and precedent which would destroy uniformity of methods for regulating properties, but the requirements of different cities would prevent the comparison of operating repairs among the companies themselves. Rates schedules would be computed by different methods and with chief regard to different basic conditions and standards of service such as gas pressure, candle power and heating qualities, electric voltage, water pressure, etc., would undoubtedly vary in different cities of the same state. In one instance we might find depreciation charged in operating expenses while in another city no provision for depreciation would be required. Political expediency or popular demand could frequently obtain, even above the wishes of city officials, a change in the rates exacted, or might require a standard of service which the use of the property and the revenue collected would make impossible without serious loss to the company.

The question of maintaining a commission of the character which the large utility investment in any state requires would be prohibitive for a single city. Our municipalities are today facing problems arising out of city growth and government, such as education, police and fire protection, sanitation, street improvements, etc., which are a severe burden on the public. In fact, city tax budgets are growing at such a rapid rate that conservative financiers have advised caution. For these reasons cities should look with pleasure upon the release from a function of government which is not local in character. It is not unusual to observe a city expending out of the public treasury in prosecuting a utility investigation a sum as large as that expended by some states for maintaining a fully equipped public service commission in the discharge of the regulative duties for all the cities of the state.

Utility history further shows that companies operating under short-term franchises find great difficulty in securing extensions except through granting reductions in rates or other concessions which greatly hamper the sale of securities for needed improvements. Frequently to avoid being the object of political attack, being forced into expensive litigation or threatened with wasteful competition, corporations accept such reductions, or assume duties which increase their operating expenses, as a means of escaping from an unpleasant immediate situation, hoping to secure amends through some fortunate circumstances in the future. Any course which compels a public utility to curtail expenditures of operation, to neglect proper maintenance and improvements and to

*Abstract of an address at a conference of northwest municipalities at Walla Walla, Wash.

postpone provision for depreciation, will eventually be reflected through inferior service to the public. Most of these burdensome conditions are forced on the companies because of the belief that their securities are "watered." Just how this phrase originated is not known, but it has served to create a popular impression which has been a powerful force against the development of public service corporations. Many arguments concerning such corporations are met with the ever ready answer, "watered stock," although analyses of facts show that the question of capital issues is not in the least involved. This same unreasoning attitude of the public has been a barrier to the proper consideration of many utility problems between city and utility officials and has prevented much needed betterment of service.

Another of the misunderstandings of the public which has done much to bring about state regulation has been the abuse of the power of municipalities to grant franchises to competing utilities. In every state where public service commissions have taken up in earnest the great work of corporation control there has been announced the doctrine that a public utility is a natural monopoly and that the interests of the people are best served by regulating and protecting such monopoly in the discharge of its duties as long as it conforms to the obligations of the law. Opposed to this, the policy of our cities has been to encourage competition and in this manner they have helped to create the very conditions which are now criticised and from which they seek to escape. It is difficult to comprehend what a city expects to accomplish by permitting another utility to enter its boundaries when there is already one which serves the public adequately at reasonable rates. If the existing utility is giving inadequate service or is charging excessive rates the remedy lies in the power to compel that company to improve its service or to reduce its rates instead of inviting another similar corporation to tear up the city pavements for its pipe lines or rails, or to deface the streets with additional lines of poles. If an existing company is rendering adequate service at reasonable rates there is nothing to be gained by duplicating the plant and expecting two utilities, each completely equipped, to exist on the traffic and service which heretofore has supported but one company.

State regulation is further desirable because through it is possible the regulation of municipally owned utilities as well as those privately owned. There is no reason why a distinction should be drawn in the regulation of utilities because of the character of the ownership. It is immaterial to the consuming public as to who furnishes the service or who owns the plant so long as the service is adequate and efficient and the rates charged are reasonable. There should not be included in the cost of service any item incurred through a matter of sentiment concerning either the corporate or municipal form of ownership. The paramount consideration is as to which can render the best service at the most reasonable rates. The tax-payer and subscriber to utility service is entitled to receive from the municipal plant the same publicity of accounts and operating conditions, the same regard for actual costs, and the same compliance with the service requirements which are exacted of privately owned utilities. A municipally owned utility should not be operated as a source of revenue for the general fund of the city, nor should the city or any class of customers receive service at a rate which is discriminatory with respect to other classes. State regulation of municipally owned utilities is not an infringement on municipal rights; it merely provides that when a city chooses to engage in a quasi-public undertaking it shall discharge that duty with the same degree of efficiency and for as reasonable rates as would be required if the obligation were discharged by individuals or corporations.

That municipal regulation has not been attended with success is due to the fact that the regulation of the modern utility company is not a municipal function. In our theory of government there are certain functions which are distinctly local in nature. Some are state functions, while others are national in scope. Whatever character the utility may have assumed in past decades it has lost through the growth of modern conditions in which it has taken a prominent part. The regulation of such corporations in their present state-wide operations, and even interstate relation, is no more a municipal function than is the question of public education, the administration of justice, regulation of banks, or the care of the criminal and unfortunate classes. As industry and governments grow, new functions for the body politic constantly arise, while the older functions assume new aspects and those once local in character become functions of the state, just as many former functions of the several states are now being exercised by the federal government.

Prominent among such changes has been the growing demand for state-wide regulation of all public service corporations. The conditions which affect one form of service also affect the other, and so closely inter-related are those forms of business that they cannot be successfully regulated by a score or more municipalities each operating independently. The arguments for regulation today are founded on broad principles of public policy. Modern economic thought and legislation seek to give stability to invested capital in legitimate enterprises, the substitution of a perpetual franchise or indeterminate permit for the short-term franchise, with the evils attendant upon it, the publicity of accounts of monopolies, definite standards of service, and the physical valuation of properties charged with a public duty. It is opposed to political interference with the public service, is opposed to the waste of resources, and aims to accomplish these desirable ends through a permanent state administrative agency. Such regulation of all public service corporations through a single commission properly authorized by law and provided with facilities for the investigation and determination of all questions affecting such corporations has proved to be a success in Massachusetts, New York and Wisconsin and in a large number of states which have recently adopted this policy and modeled their legislation on that of the last two states.

South Dakota Commission News

Protesting against the proposed merging of the two telephone companies in Sioux Falls, a petition to the South Dakota Railway Commission was started in circulation by Harry Bershon. The petition asks the commission to stop the proposed merging of the two telephone systems, on the grounds that it will be detrimental to the best interests of the city. It also protests against the increase in the telephone rate and asks the commission to submit the matter to the voters of the city at the spring election.

When the Telephone Means Everything

By Mabel Condon

THERE'S a man in St. Louis, Mo., who is more grateful for the invention of the telephone than for any other material thing in life.

He is Arthur E. Rump, of 6007 Eitman avenue, who for the last three years has been a hopeless, helpless invalid, anchylosed in all joints of the body, except those of his arms. But with his arms and hands to do his bidding, he is able to use the telephone and has made its use a means of livelihood, substantial and interesting. This he has done by installing in his home the telephones of the Kinlock and Bell systems; and over them, he solicits and obtains magazine subscriptions which net him a monthly income of more than two hundred dollars.

With His Arms and Hands to Do His Bidding, He Is Still Able to Use the Telephone.

This is a most satisfactory return for the daily hours the invalid spends at the two telephones which stand on the table at his bedside or on the arms of the "stand-up" working chair in which the invalid likes best to spend his time. Aside from the financial success which Mr. Rump has attained, there is the accompanying satisfaction which comes with the knowledge that he is doing and acting in the world of events; that once again he is a "man with a job," earning the wherewithal by which life is lived and which, during his long illness, was procured by the untiring toil of his wife.

Mrs. Rump was skilful in the art of retouching photographs and she was able to do this work at home where her attendance on her husband was also needed. She managed well, but the obligation thus imposed upon her was a constant source of worry to the invalid. It was on her account, mostly, that his enforced inactivity galled him.

Then there came the day when he was inspired with the idea of obtaining magazine subscriptions via telephone. Why not? The telephone was constantly used by men in their business so why not make the use of the telephone his business?

Ready for Work, with His "Stand-Up" Chair and His Telephones.

He told his wife of his idea and she gave him wholehearted encouragement. It was some time, though—two months, Mr. Rump claims—before he fuily determined to go into the subscription business. He was tormented with the thought, "Suppose I'd be turned down or couldn't 'catch on' to the system of doing it?" But he did not let this stop him.

While he was well and active, Mr. Rump had many friends; these he had kept, owing to his optimistic nature, which remained even in the face of adversity. These friends all heard from Mr. Rump over one or the other of his telephones and they, in turn, told others about him. Thus an endless chain of subscribers and prospective subscribers was added to the list which the patient submitted monthly to the publishing house. A salary and commission basis is that upon which Mr. Rump works and renewals count the same as new subscriptions, bringing him a constantly cumulative return.

His success dates from the day he wrote to a publishing house in reply to an ad for solicitors. The answer delighted him; the company expressed its entire willingness to give him a try at the work. That was the first of August.

So the first thing he did was to order the installation of two telephones, and when all connections had been made, he set to work to win. And he did. On August twenty-sixth he wrote the publisher a letter telling of his success for the month and adding that he wrote on that day because it was the tenth anniversary of his marriage to "the best woman in the world." His income for August was seventy-five dollars and prospects that, he felt sure, would mean a considerably larger sum the following month.

His premonition was correct, for his September earnings were but little less than two

hundred and fifty dollars. The pleasure of the man who had lain still for three years was unbounded. He was naturally an optimist, but now the world spread itself out before him in a golden glow, the value of which he was to compute with the telephone as a gauge.

And now he is to open a general subscription agency. Another thing, he just won a typewriter in a subscription contest and, by using his "stand-up" work chair, has learned to operate the machine, which will be an added help as he will thus widen the scope of his agency by soliciting by letter those he is unable to reach by telephone.

The "stand-up" chair, by the way, is an invention of a mail-carrier, George Swanson, with whom Mr. Rump formerly worked. The chair allows the user to stand in an upright position with his feet on the floor, yet its bicycle seat supports him in such a way as to insure him absolute comfort. Mr. Rump says he is now able to stand up in his chair six or seven hours a day.

The patient is but thirty-eight years old and came to St. Louis from Troy, Ill., where his father is in the milling business. He obtained work in a city mill and about the same time met the girl who later became his wife. She was Alice Eberle, whose photograph, taken several years previous, and entered in a prize exhibition under the title, "The Fisherman's Daughter," won for the photographer the diamond medal at the Paris exposition.

Work at the mill was not steady and, as Mr. Rump wanted to marry, he sought employment elsewhere. He obtained it at the St. Louis post-office. That was twelve years ago. When he had been in the government's service for nearly two years, he met with an accident which at the time seemed so slight that he paid little attention to it. While working at the Union depot post-office station, one day, he was struck on the head and left shoulder by a one-hundred-pound bundle of newspapers thrown from a car. He was thrown down and for a while was insensible, but his one hundred and sixty-pound constitution made little of the matter and apparently suffered no ill effects.

At the end of the second year, he married Miss Eberle. Shortly afterward, his suffering from the effects of the accident began. He was treated for rheumatism and for five years continued his work in constant misery. For two years he went to and from work on crutches. Then came the day when he was put in a plaster cast from chin to ankles. Ten months later he was taken to his home from the hospital; his joints had anchylosed and he was a helpless invalid.

But through it all, he remained an optimist and in his optimism was born the desire to again "be up and doing." Then followed his advent into the subscription business and his adoption of the "stand-up" chair.

His pleasant voice, as it comes to a prospective subscriber over the telephone, wins him many new names for his magazine list daily, and he is very sanguine as to the future. For he now not only has his two telephones as a means whereby he can increase his business, but he also has his typewriter; and then, too, there is that endless chain of friends.

But to the telephone Mr. Rump attributes all credit for the success of the scheme which has meant untold happiness to himself and wife.

Telephone call boxes are to be provided in the streets of several German cities, at which charge per call will be a halfpenny.

Big Increase in Lincoln Traffic

A peg count made recently at the Havelock exchange of the Lincoln (Neb.) Telephone & Telegraph Company, shows that the consolidation there has increased the use of the service 68 per cent. The showing is regarded by telephone men as remarkable. It invariably follows that where two exchanges in a city are consolidated, an increase in the number of calls occurs, because a unified service has supplanted a divided one, and everybody with a telephone can then talk to everybody else in the city who has one. At Havelock it was calculated that the increase would approximate 10 per cent. Instead it has been nearly seven times that percentage of increase. Havelock was previously served by the Plattsmouth Independent Company local and by the Bell from its University Place exchange. With 10 per cent added to the combined number of calls on these two exchanges, it was estimated that the daily number of calls, after consolidation, would not exceed 2,741. Instead it has been 34. This count was taken three weeks after the new consolidated exchange was put into service, when it might be expected that the novelty had worn off.

Under the old order of things the number of calls per station (telephone) was 6.2 a day. It was estimated that on the consolidated exchange, it would be 6.8. Instead, it has reached the high mark of 10.2. It was estimated that the number of calls during the busy hour would not exceed 214 for each operated. Instead it has reached 317, and makes practically necessary an addition to the switchboard and the employment of one more operator.

Insists on Eight Per Cent Dividend

A return for its stockholders of eight per cent on the valuation of its property when the new rates are fixed was asked by the Chicago Telephone Company at a recent hearing before the city council "gas-oil" committee in Chicago.

N. T. Guernsey, counsel for the company, made the request and assured the aldermen that without at least that much profit the company could not interest investors to keep Chicago's telephone system financed. Professor E. W. Bemis, the city's expert, has recommended a return of only 6.75 per cent.

"This will not be enough," said Mr. Guernsey, discussing the latter rate. "In the next sixteen years we will need $64,000,000 to put into the property. Where are we going to get it?

"We will have to go into the money markets and offer a sufficient inducement of profit to cause owners of money to invest it. We must compete with every other industry and will have to pay as great a return for the money as any other industry will pay the investors. If we don't we can't get it.

"What rate of return will get us this money? Eight per cent is more or less a standard of profit for a telephone concern. You cannot bring in a man who knows about the value of money but who will say that eight per cent is a low return, and you can't induce men to invest for less."

The company's lawyer submitted figures showing an error of $3,887,945.60 in Professor Bemis' computation of future depreciation allowance based on the difference between the cost of the company's property and its present value.

Digest of Foreign Telephone Literature

By Fred W. Scholz

TELEPHONE DISTURBANCES ON ELECTRIC RAILWAY LINES.

THIS question, whose importance for telephone lines is considerable, has not been treated very extensively, and the following article will therefore be of some interest. The observations were made by Doctor Marguerre on the telephone line running parallel to the single phase electric railway line used by the gigantic nitrate and saltpeter plant on the Rjukan river in Norway, from which the plant and railway takes its power.

The railway line is only 46 km. long, and passes part of the distance through woods, which has a considerable influence on the telephone line. The railway has to pass through a mountainous section. The two lines use single-phase alternating current, 10,000 to 11,000 volts at 16 periods. The wires run about 18 feet above ground, have a cross section of 0.1 square inch and are mounted on iron poles with plain insulators. The locomotives are provided with two and four motors of 125 horsepower. The current for the railway is provided by two transformer stations at the ends of the line, where four-pole, single-phase generators feed current at 10,000 and 11,000 volts to the railway. Each generator has a capacity of 400 K. V. A. As a rule there is only one locomotive on the line and the current used by the same rarely exceeds 40 amperes, except near a heavy grade, where it reaches 60 amperes. When starting, there may be current impulses of 70 to 80 amperes. The greatest voltage drop occurs about 25 km. away from the transformer station, and the current being then of 60 amperes, drops 580 volts, of which number 383 volts are computed for the feed wire.

There are two groups of telephone wires running along the railway line. There are several private lines, which run at quite some distance from the railway, and cross the latter only at a few places; these lines are partly single, partly double. The second line belongs to the company, and consists of three double lines and also a telegraph wire, mounted on wooden poles, consisting of 4 mm. iron wire on ordinary porcelain insulators. The telephone wires in some cases are only 30 feet away from the high tension feed wire of the railway line, and in some cases even as near as 10 feet to the latter.

As it was to be expected that such a slight distance between telephone line and railway line would result in disturbances, telephone cables were used. When ordering the lead cables, the company supplying them guaranteed good and clear communication, but not long life under the existing conditions. The cables had to be suspended from steel cables, and the storms so common in that part of Norway, promised to bring much trouble to the lead telephone cables. It was out of the question to lay the cable in underground conduits on account of the great expense.

The three most important sources of trouble are the loss in voltage due to the grounded return circuit, the electromagnetic and the electrostatic induction. The former was met by doubling all the telephone lines that were single. When the railway line was opened to traffic, it was found, however, that this precaution was not effective, as the 16-cycle current made every telephone instrument along the line ring constantly at certain times. The two other disturbances could not be referred back to the selection of the 16-cycle current, as it is the higher cycles especially that give the greatest amount of trouble. In regard to the electromagnetic inductance, it was presupposed that the current returns exclusively by way of the rails. With an average distance of 30 feet between telephone line and railway feed cable, and a horizontal position of the telephone loop with a 16-inch opening, we find an induced tension of 0.016 volts per km., the current being at 16 cycles and 40 amperes. With the poles about 130 feet apart, we obtain 4.10^{-5} volts; when using current at 1 ampere and 600 cycles, and at about 640 ohms, would lead to an impedance effect in the telephone receiver of 1.10^{-7} amperes, which gives a sound that is hardly audible. The differences in distance between the telephone and railway wires would increase this impedance, however. For the electrostatic effect we must consider the voltage of 715 at a railway wire voltage of 10,000. This induced voltage does not cause disturbances, provided the telephone wires are twisted, so that both lines are equally induced and show no difference in potential. If both lines are not perfectly insulated, which is usually the case, a current will pass through the faulty insulation to the telephone instrument and will give trouble.

To prevent harmonic oscillations, the slots in the locomotive motors were slanted. Against the induced tensions occurring in the field windings of the motors due to the short circuiting of the brushes, there is no remedy, except getting rid of these short circuits.

When the operating of both telephones and railways was started, the double lines gave a very disagreeable and strong sound, which was heard every time a locomotive started. This sound was a howling, high pitched tone, which did not last any length of time, however, and was not the worst trouble. When all the locomotives were at rest, the telephones gave a deep, peculiar noise, similar to a flat wheel passing over hard ground. This noise increased when the locomotives were in motion, and was not influenced by the speed of the latter. In damp or wet weather communication was almost impossible. This was partly remedied by improving the insulation at several of the worst places, but even then the effect was anything but satisfactory.

An oscillograph was then used to find the causes of the various disturbances. When running without load, a fifth and seventh harmonic vibration was found as also a slot harmonic oscillation of a few per cent. The amplitude never passed beyond 2 or 3 per cent with a number of oscillations of 560 per section. Then the oscillograph was tested with a locomotive running at a speed of 10 km. and a load of 40 amperes. The same test was repeated at 50 amperes and 11 km., and

66-ampere load and 22 km. speed. The result showed that the causes of the disturbances are not to be found in the motor slots nor the commutators, but in the generators. It was noted that if a non-inductive load was used, the upper tones were hardly audible, while with an inductive load the uppers were increased in volume.

In order to remedy the causes of the trouble, it was first planned to start with the generators, but as this offered too many difficulties, the telephone instruments were tried. The greatest drawback to this method was in the fact that the frequencies of the disturbances were about the same as those of the ordinary speaking currents, so that many remedies would relieve one difficulty and increase another one. Some little effect was obtained by using high tension insulators for the telephone wires and using transformers on the line. But this was only done on a limited scale, as the transformers prevent clear and loud communication, and this method is very expensive, without eliminating all of the faults. The first real remedy tried was in improving the insulation near all the buildings where telephones were used, and laying telephone wires in the same way as light wires. Discharge coils of greater resistance but smaller self-induction were used. The noises were decreased but the duplex telephone line was made useless. The discharge coils or resistances which are connected exactly like the coils used for the introduction of the speaking current, form a direct short circuit to the latter, parallel to the telephone, excepting the ohmic resistance, of course. The telephone could be used, however, and gave opportunity for experimenting with the generators.

It was impossible to change the pole shoes, as this would have required a complete reconstruction of the rotor. A resonance circuit consisting of a capacity and self-induction was connected to the terminals of the generator. This was to short circuit the generator for about 550 periods, i. e., no voltage was to be given off to the lines at this number of periods. The unknown self-inductance of the generator need not enter into the problem, since the tension at the terminals was to become zero. Only the new circuit had to be balanced to resonance. For this, the value of 0.2 microfarads, and 0.40 henry, was found the best, which gives a computed frequency of $c = \frac{1}{2\pi}\sqrt{\frac{1}{0.4 \times 0.2 \times 10^{-6}}} = 568$, corresponding to some degree to the frequency used in the system. After the completion of this change, the noises in the telephones were almost eliminated, except when the locomotives started, so that the line is as efficient as can be expected under these adverse conditions.—*Elek. Zeit.*

MARINO SYSTEM OF TELEPHOTOGRAPHY.

The process is based on the light and electric effects of selenium, whose inertia is eliminated by using seven selenium cells, placed in parallel, each of them sensitive to one of the fundamental colors of the spectrum. The transparent film, slide or picture to be transmitted, which may be colored, is placed between an arc lamp and a prism, which divides the colors in the picture into the spectral colors. These fundamental colors are then thrown vertically down upon the selenium cells. The picture is divided into the necessary smaller sections for transmission, by passing a black strip, provided with perforations which cover the latter in regular intervals, in front of the picture. The difference in height between each layer of perforations is equal to the diameter of the perforations. Depending on the position of the black strip, a different color ray is passed through the perforations, and strikes the proper selenium cell. At the receiving station, a dark room is used, also provided with an arc lamp. In front of the rectangular window of the dark room, a similar black perforated strip moves synchronously with that in the transmitting station. The electric currents produced by the differences of resistances in the selenium cells, causes changes of light in the direct current arc light, which reproduce the picture in the dark room upon a photographic paper which is very sensitive to light.

A slightly changed process by the same inventor uses a photographic dark room instead of the arc lamp and dark room. Here a good photographic lens is used, and the perforated strip moves in front of the lens and a frosted glass. When transmitting the picture, the strip is moved in synchrony with the strip at the receiving station, whose equipment is the same as that described above.

Marino speaks about a third method for transmission of colored photographs. In this case he uses three different series of electric oscillations, sending them over the same wire, but having them received at the receiving station by means of three separate instruments. He produced electric waves of different length in a Poulsen arc. The selenium cells, each sensitive to a certain color, are divided into three groups. The first and third group have two cells each, the second group has three cells. The cells are shunted to a self-inductance, which is connected to the current feeding the Poulsen arc. At the receiving station three detectors are connected in three different resonance circuits. Each circuit is regulated to a certain frequency, which corresponds to the waves of one of the three Poulsen arcs at the transmitting station. The three detectors are connected to three arc lamps, and each lamp is provided with a color filtration apparatus, which absorbs colors in such a way that the union of the three pencils of light gives a white light.—*Elek u. Masch.*

TELEPHONE SYSTEMS FOR MINES.

A new telephone system was described at a recent meeting of the Mining Society in Vienna, which is said to be much safer than some other systems now used in mines. Since the wire connections in telephone lines are liable to give trouble, and any possible telegraph system is out of the question due to the danger of ignition of mine gases by a spark, the following system has been tried out in an Austrian mine and has given much satisfaction. In this system the inductive effect of a wire loop, placed in the mine shaft, upon a mine cage hoisting rope which is connected to a conductor cable, is used for communication between the men in the hoisting cage and the hoisting engineer on the surface. The transmitter consists of a microphone, whose diaphragm produces high frequency currents, which are brought to a high ten-

sion by a transformer. These currents pass through wires placed in a pipe line or else insulated and passing up and down the shaft with the hoisting ropes. They have an inductive effect on the wires which are connected to the receivers. A buzzer is used for making calls, which acts upon a diaphragm in the receiver. This opens a closed circuit, and acts upon a relay, which closes the buzzer circuit. Twelve volts and 0.5 amperes are used for primary energy. Tests made for as great a distance of transmission as 1.2 miles showed no sparking effect, thus making this a safe and efficient telephone installation in mines.—*Elek. u. Masch.*

A LEGAL TELEPHONE QUESTION.

A legal question has recently been discussed in Germany, which, although less pertinent in this country, may, however, have some bearing on the relation between the private citizen and the telephone company under certain conditions. The post office department, which operates the Berlin telephone system, some time ago disconnected the telephone of one of the subscribers, a lawyer, and refused service both in the state telephone system and in a private telephone system. It seems that the subscriber in question had a quarrel of some kind with a telephone operator, and the latter reported this incident to the proper authorities, whereupon the state disconnected the lawyer's telephone. The lawyer, to avoid further difficulties, asked that his number be connected with the firm in whose service he stood, and the post office department refused to allow a private exchange on the switchboard system of that firm. This happened in April, and in July the ex-subscriber received the bill for his telephone service from July to October. This bill was paid and receipted by the telephone authorities, without, however, giving the service for which the lawyer paid. All who called for this number, nevertheless, were told that the line was disconnected, intimating that the dues had not been paid.

This case opens several questions. One is this: That, inasmuch as public ownership of some service is equivalent to a monopoly on the part of the government, had the latter any right to exclude any citizen from enjoying the service, regardless of private reasons? The effect on the citizen is the same as is the case in mail matters. Every one is obliged to use the mails run by the state and where the telephone is under state ownership, the same holds true. It is no more than right that the contract binding to one party be also binding to the other, and that the state be obliged to give service to every citizen. The principle which lies back of this question is of great importance. It is without doubt a dangerous policy which allows a state office, instituted for the benefit of the people, to refuse service to any man for private reasons. It would be an analogous case, if the postal department would refuse to send the mail of a certain man who has had a quarrel with a postal employee or if a railroad would refuse to transport a passenger who has had an argument with the train conductor.

The other side of the question, that of the post office, or rather the telephone department of the postal service, is explained by that department in this way: They claim that the above lawyer has overstepped the boundaries of good breeding and gentlemanly behavior several times, and has insulted the telephone and telegraph operators, receiving warning each time. His telephone was disconnected more than once, but always connected again. This last time, they claim, his language was worse than ever, and so they disconnected his telephone for good, and do not intend to connect again, unless forced to that end by the

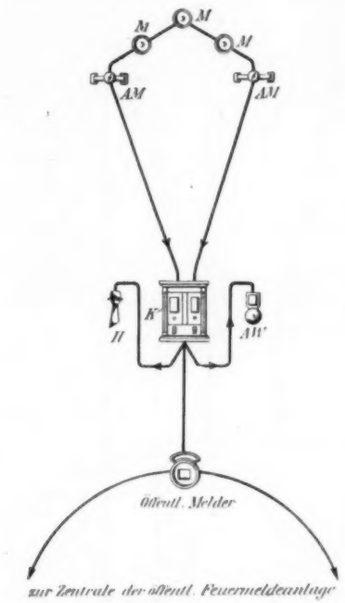


Fig. 1.—Fire Alarm System for Factories.

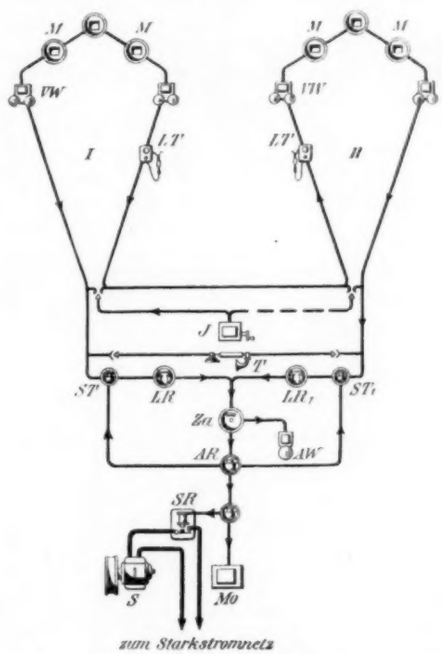


Fig. 2.—Fire Alarm System for Cities of 10,000.

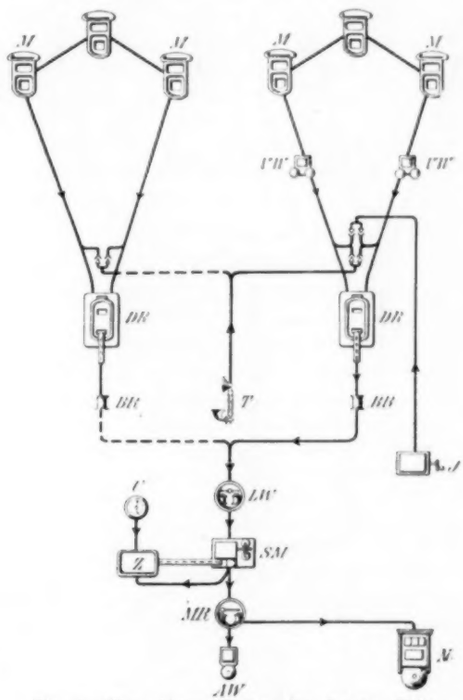


Fig. 3.—Fire Alarm System for Larger Cities, Having Municipal and Volunteer Fire Department.

courts. They say that no conclusions for similar cases can be drawn from this one instance. We leave this action without comment.—*Zeit. f. Schwachstrom.*

NEW PUBLIC TELEPHONE SYSTEM.

Several of the South German cities as well as many of the larger cities in Westfalia have installed public telephone stations recently, which offer a novelty in some respects. They are found on busy street corners and on squares and are in the form of round towers of moderate height (about one story) and might be compared to a large size telephone booth. The booth opens automatically on insertion of a 5-penny piece (1½ cents) and the telephone user can then make as many calls as he chooses. As the telephone lines are under state supervision, being operated by the post office department, arrangements have been made by the private companies backing this new movement, to allow as many talks as required for each user. The booths are to be used for advertising purposes and to that end have double glass windows, between which the celluloid advertisements are fastened. In the evening these booths and advertisements are illuminated. The booths can only be used during post office hours and cannot be used after 8 p. m. The cost of one of these booths is figured at $250—*Zeit. f. Schwachstrom.*

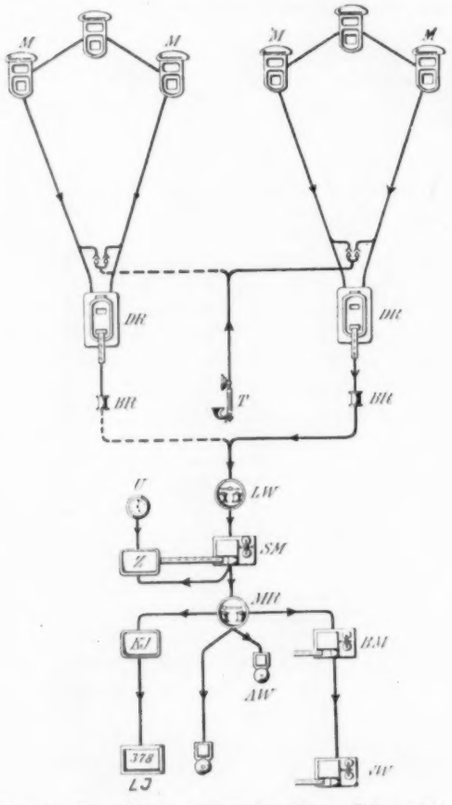


Fig. 4.—Fire Alarm System for Large Cities with Municipal Fire Department.

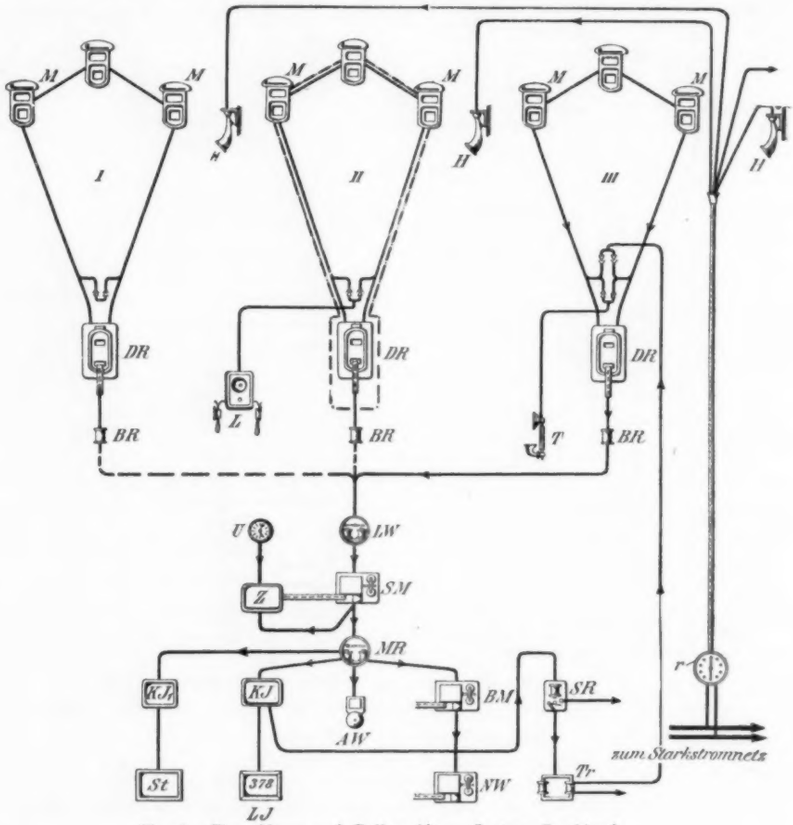


Fig. 5.—Fire Alarm and Police Alarm System Combined.

TELEPHONE-TELEGRAPH FIRE ALARM SYSTEMS.

Many of the German cities have found it conducive to the general safety against fires to install a combination of telegraph and telephone for fire alarms, and the following abstract will describe several of the more common systems.

The essentials for fire safety and prevention of conflagrations are immediate notification of the fire department of the fire, accurate location of the same, and smallest possible waste of time between the alarm and the action of the department. The older telegraph system has been very efficient, but has one drawback in that the seat of the fire is only approximately known, and that much time could be saved if the fire department knew the exact location. The telephone would eliminate this difficulty, for the person giving the alarm could give the location, thus guiding the fire apparatus and avoiding dangerous delays.

Where there is a large, complex group of buildings, as in a factory, it is essential to reach the alarm from any part of the plant, or even to have the alarm sent in automatically. Fig. 1 shows such an arrangement for automatic alarms. The automatic alarms *AM* are arranged along the ceilings, where the heat would be the greatest in a possible fire, so that the contact would melt and set off the alarm. In the halls and the different parts of the building, push buttons *M* are installed which allow a similar alarm to be given by the person on duty. All push buttons are connected to a drop disc indicator, which has as many discs as there are fire stations in the district. The indicator is provided with a red and a green lamp. The green lamp shows trouble, the red lamp fire. As an acoustic signal a loud siren can be used, or else a loud

alarm bell *AW* or the megaphone *H*. Near the switchboard of the factory is an indicator which shows the number of the fire house and district alarmed. The alarm bell is stopped by disconnecting the disc. The disc will be half visible, however, and the two lamps will show whether there is only some disturbance in the line or a fire.

Figure 2 shows a fire alarm system that can be used for smaller towns up to about 10,000 people having a volunteer fire department. The public fire boxes are used in this system *M*, which are attached to lamp-posts or houses. The alarm bells *VW* are installed in the homes of the members of the volunteer fire department. In the homes of the officers, the mayor and other officials, telephone instruments are connected to the alarm bells and these are shown in *LT*. The telephones are connected to the headquarters or the police stations or else to the telephone exchange. The exchange has a numerical counter indicator *A*, operated by the line relays *LR* and LR_1. To call up the exchange automatically in case of trouble, the two relays *ST* and ST_1 are used, which are cut off automatically by relays *AR* after an alarm has been given. The alarm is transferred by the counter system to the morse instrument *Mo*. At the same time a high tension current siren *S* can be operated by the high tension relay *SR*. The telephone T is used for telephone connections. The alarms and telephone are distributed in the different districts but collected at one central point. The volunteer fire department is alarmed by the inductor *J*, which can be connected with any of the districts *I* or *II*.

An efficient system for larger cities up to 50,000 inhabitants, having a city fire department, as also a volunteer department, is shown in Fig. 3.

The alarm boxes *M* are usually provided with telephones and are directly connected to the recording instrument *DR*. Fire alarm bells are installed in the homes of the volunteer firemen, shown in *VW*. As the homes of the same are usually in one section of the city, the latter being divided into fire districts, it is advisable to use a separate wire for connecting the alarms. If cables are used for the telephone and telegraph wires, it is especially desirable to have the alarm bell wires separate, so that the disturbances unavoidable in the bells may not be distributed to the cable conductors. The central exchange, whether fire alarm station, police department, or telephone exchange, probably the former, is provided with an inductor *J*, a telephone *T*, a morse instrument *SM*, and a time recording apparatus *Z*. A multiple relay *MR* passes the alarm to the central station, which in turn passes it on to the indicators *NJ* and the alarm bell *AW*. *LW* is a numerical selector, which selects between one of the alarms running in at the same time, passing the one on for immediate action, recording the other, and only passing it on when the first one has been communicated to the proper district. The telephones can be connected with any desirable district.

For large cities with city fire department exclusively, the system shown in Fig. 4 can be used. It is about the same as that in Fig. 3. The alarm boxes *M* are connected in each district to the double recording instrument *DR*. The telephones are connected as in the other system. All of the fire stations have morse telegraph instruments and are directly connected to the fire headquarters. The wires of the fire stations *NW* end in a morse apparatus *BM*, used to send out orders to the different fire houses. Most of the fire stations have a large lamp *LJ* operated by the contact indicator *KJ*. The multiple relay *MR* takes care of the transmission of alarms to the several district fire stations.

The last diagram, Fig. 5, shows the arrangement used in cities with a combined fire alarm and police alarm system. Where it may be necessary to have both police and fire department at the scene of the fire, this system has been found excellent. The alarm boxes *M* are provided with special telephone instruments for use of the police department. These telephones are connected to the exchange and from there to the fire alarm box and the fire or police headquarters. It is therefore a regular telephone system. In this case a special return fire alarm bell signal is arranged for, operated by the multiple relay *MR*, by way of the contact indicator *KJ*, relay *SR* and transformer *Tr*. To call policemen on the various beats, megaphones or horns *H* are installed in various parts of the city, which are operated by special wires, and are connected at the central exchange or headquarters by a switch *r*. The transparent street sign indicator *ST* is operated by the contact indicator KJ_1.—*Elek. Zeit.*

Hold Memphis Rate Ordinance Invalid

In the case of the Cumberland Telephone & Telegraph Company against the city of Memphis, the United States Circuit Court of Appeals has handed down a decision to the effect that the city has no authority to regulate the rates charged for service by the company. The case is remanded to the United States District Court at Memphis with directions to grant the injunction desired by the company. In the opinion, which was written by Judge Denison, it is stated that the power to regulate the rates of a public utility is a legislative one held by the state and not by the city and, therefore, the rate ordinance enacted by the city council of Memphis is invalid. It is held by the court that the legislature of Tennessee has not granted to municipalities either specifically or indirectly the right to regulate the rates charged by telephone companies, although it has specifically granted them the right to regulate district-telegraph, gas, street-car, belt-line-railroad and switching companies. If the rates charged in Memphis are unreasonably high, the court says that the legislature will doubtless proceed to regulate them or delegate that authority to municipalities, although it has not yet done so.

Advises Automatic for New Zealand

A report has been presented by Mr. Buckley, chief electrician of the post and telegraph department of New Zealand, who last year toured America, England and Europe with the object of studying various systems of telegraphy and telephony. He states that an automatic system of telephones would most satisfactorily meet the requirements of New Zealand and would possibly permit of an extension of the area within which a minimum residential rate might be charged. Mr. Buckley computes that a saving of over $10,000 a year might be expected from an automatic system at each of the four cities, namely, Auckland, Christchurch, Dunedin, and Wellington.

Utilities Inquiry Nearly Completed

National Civic Federation

WHAT constitutes adequate regulation of public utilities?

To what extent is it desirable or necessary for the state to go in regulating the service and charges of railroads, electric, gas, telephone, telegraph, water and other utilities in order to protect and further the rights of consumers and of the public and to save harmless the rights of the companies?

These questions have been under consideration by the Department on Regulation of Interstate and Municipal Utilities of the National Civic Federation for nearly a year now, and the work will soon be completed. The answers of the department are expected to be embodied in a model bill which may be used by states which are about to adopt a comprehensive system of regulation or to perfect a system heretofore established. Further legislation of this character is being actively considered in many states, such as Pennsylvania, Indiana, Illinois, Minnesota, Missouri, Texas and others. The legislatures of most of these states meet in 1913, and the suggestions of the National Civic Federation should be very helpful in drafting the new laws.

The investigation conducted by the department has extended from ocean to ocean in this country and includes a painstaking examination of conditions peculiar to the English system of regulation. An exhaustive compilation and analysis of the statutes of the United States and of the several states of the Union has been made. Court and commission decisions have been abstracted and digested. A number of special reports have been prepared. Investigators of the department have visited in person many of the important state and municipal commissions.

The investigation has exceeded greatly in its vastness the expectations of the department. At the start no effective means was available for ascertaining readily the status of railroad and public utility laws in the various states of the Union. It was apparent that the laws now on the statute books must be compiled and analyzed in a manner which would enable those who drafted the provisions of the model bill to ascertain what principles had been embodied in legislation and where.

15,000 SECTIONS BOILED DOWN.

Several weeks were spent in gathering the laws which are administered in the various states by the railroad and public service commissions. Clipping, pasting, copying and sorting the great mass of material so compiled consumed several more weeks. Probably no less than 15,000 sections of statutes and constitutional provisions were thus distributed preliminarily among the various main divisions of the subject matter of the investigation. Digesting, analyzing and editing this raw material has consumed upward of six months of the time and effort of a staff of six men and five women.

HOW THE WORK IS ARRANGED.

The compilation and analysis when completed will be unique. The entire subject matter is divided first into some sixteen parts. Each division is composed of a number of topics, ranging from three or four for some divisions to fifteen or twenty for others. Many of the principal topics are divided into several sub-topics. The material for each of the forty-three states having railroad or public service commissions and of the United States is displayed in alphabetical order by jurisdictions under the several topics or sub-topics. A system of abbreviation is employed which eliminates all unnecessary verbiage, but leaves the sections of the statutes substantially in the language of the lawmakers. Each paragraph is followed by a citation referring the reader to the original source of the material. A simple but complete system of cross-referencing is employed and the entire work is to be carefully indexed.

IMPETUS TOWARD STANDARDIZATION.

The compilation and analysis will be of inestimable value to public utilities, law-makers, administrators, students and the public at large. Here, and here only, may be found in compact form authoritative information concerning legislation on this important subject. It will be more than a mere reference work, such as a digest. Comparisons can readily be made between the provisions of any one state on a particular subject and similar provisions of all other jurisdictions. The compilation and analysis will afford a great impetus to a very necessary movement for the standardization of laws governing the relations of public service enterprises to their patrons and to the public. From a practical standpoint public service enterprises are recognizing the existence of state lines less and less every day. Consequently, standardization of the laws governing their public relations is of the utmost importance.

ANALYSIS OF LEGISLATIVE POLICY.

No satisfactory attempt can be made to meet on a uniform basis the problems of public utility regulation throughout the country without analyzing the principles which are now embodied in the legislative experience of the various states. For a period of upwards of twenty-five years, generally speaking, most of the states and the federal government have been developing legislative policies in these matters. A superficial examination of the laws of some of the states serves to indicate how completely wise and wholesome principles have been overlooked. In a number of states the pendulum has swung too far in one direction; in others it has gone equal distances in other directions. If success is to attend the effort to crystallize public sentiment on principles of regulation the legislative experience of all of the states must of necessity be consulted.

As rapidly as preliminary drafts of the several divisions of the compilation and analysis have been completed they have been printed and sent to all of the commissions in the country. Members of the commissions have been urged to examine the references to the laws of their own states and to notify the department of changes required to be made in order accurately to represent the situation in their jurisdictions. These divisions have also been sent to other interested persons, in every case with a specific request for suggestions and criticisms. In this manner several thousand pamphlets have been distributed in all parts of the country.

SECTIONS OF MODEL LAW PREPARED.

Following the preliminary work on the compilation and analysis, model sections on each of the divisions of

the statutory material have been prepared by the investigating staff. These have been submitted in the first instance to the several committees of the department represented in the executive council, and secondarily to the members and officers of railroad and public service commissions and other interested persons. Again criticisms and suggestions in detail were invited. By means of circulars and in other ways the suggestions received by the department have been placed in the hands of the committees. Every effort has been made to interest in the investigation men who are engaged immediately in the working out of problems of regulation and to obtain contributions of their knowledge and experience.

ORGANIZATION OF WORK.

For the consideration of the various parts of the proposed model bill the department is organized with a number of committees, each of which is represented by its chairman in the executive council, or board of directors, of the department. The scope of the activities of the several committees is indicated by their titles, which are as follows:

Committee on Accounts and Reports.
Committee on Capitalization.
Committee on Form.
Committee on Franchises.
Committee on Rates.
Committee on Safety of Operation.
Committee on Service.

SPECIAL STUDY OF MUNICIPAL REGULATION.

The personal investigation of municipal regulation of public utilities has developed much valuable information. Experiments with this form of regulation have been more extensive in cities on the Pacific Coast than elsewhere in the country. The department will have accomplished a worthy purpose if it succeeds in giving some direction to the movement for clear demarcation of the limits of local and state authority in a solution of public utility problems.

The investigation in England was directed primarily to the application of the sliding scale principle. The sliding scale contemplates the automatic adjustment of the relations between rates or charges to consumers of public utility services and dividend rates, which are allowed to the proprietors of public utility enterprises. The sliding scale plan of regulation has been employed in the gas industry in Boston for a number of years, but has not been adopted to any extent elsewhere in the United States.

Particular attention was also given in the English investigation to methods employed for the regulation of capital issues by public service enterprises and to the public audit of the companies. The plan of selling stock at auction was examined in detail. This has received very little attention in the United States. The report of the English investigation will constitute a valuable addition to the literature on the subject and will contain many ideas of great usefulness in working out corresponding problems here.

INTERPRETATIVE DECISIONS CITED.

In connection with the compilation and analysis of the laws an examination has been made of court decisions interpreting the statutes and the important decisions have been incorporated in the compilation and analysis as annotations. A careful line was drawn between decisions which involved merely the application of the statutes and decisions which interpreted the language of the statutes. The most important deduction to be drawn from this part of the investigation is that the statutory enactments have required and received very little interpretation.

The department has also caused an examination to be made of the decisions of all railroad and public utility commissions in the country bearing on the subjects of appraisals, depreciation, valuation in general, valuation of land, the treatment of property not paid for by utilities, the relation to valuation of property constructed out of surplus earnings, going value, franchises in purchase cases and rate of return. The summary of material gathered in this examination will be of the greatest use to persons interested in the administration of public utility statutes. In spite of the very considerable number of commissions having jurisdiction in matters of this kind no agency has been developed as yet for the systematic reporting of their actions and decisions. The investigation by the department should afford an impetus to the standardization of commission treatment of these important questions in the same manner that reports and digests of reports of court decisions tend to a standardization of legal principles.

The success that has attended the investigation is due in large measure to the inspiration and guidance of the chairman of the department, Emerson McMillin. Mr. McMillin has brought to the investigation the successful experience of a lifetime in the development of public service enterprises and the solution of problems of their relations with the public. The executive council, or board of directors, of the department of which Mr. McMillin is ex-officio chairman, has the following membership: Franklin Q. Brown, vice-chairman; John H. Gray, Edward M. Bassett, Martin S. Decker, Halford Erickson, Franklin K. Lane, Blewett Lee, Milo R. Maltbie, Arthur Williams. The treasurer of the department is F. C. Walcott and E. A. Quarles is assistant treasurer.

The investigation has been conducted under the active direction of Dr. John H. Gray, of the University of Minnesota, who is well known, nationally and internationally, for his studies and writings in this field. In organizing and in carrying out the work of the investigation Dr. Gray has been assisted by William D. Kerr, of Chicago, an attorney, who, in his practice, has given special attention to the public relations of public utility companies. Professor Bruce Wyman, of Harvard University, a well known authority on the law of public service undertakings, has been attached to the department as counsel in investigation. Professor Wyman personally directed the preliminary compiling and analyzing of the statutory material as well as the preparation of the court and commission decisions.

Theater Telephones for the Deaf

An adaptation of the telephone to the use of deaf persons is being introduced into the London theaters, particularly the New Theater. Each seat is to be equipped with a small box similar to those from which opera glasses are obtained, and by placing a sixpence in the slot the "earphone" as it is called, is released. The instrument is devised not so much to intensify the sound as to render it clear and distinct, so that all but the stone deaf can enjoy the performance. When the auditor fails to clearly distinguish voice or music, he places the receiver to the ear and moves a little indicator around until the required distinctness of sound is attained.

Modern Dry Cell Manufacture

By H. K. Richardson*

THE common dry cell, while a small thing in itself, is the basis of a very large industry, and thus has many points of interest for the electrochemist.

The magnitude of the industry is little appreciated by those not familiar with it. At the present time it is probable that 50,000,000 of the standard 2½ by 6 inch size; 5,000,000 of the complete flashlight batteries, consisting of about 15,000,000 single cells, mostly 2 5/16 inches high by 13/16 inch in diameter; and a large number (approximately 2,000,000) of special sizes and shapes are made in this country each year. Probably an equal number are made abroad.

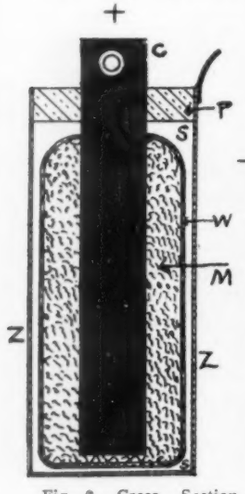


Fig. 2. Cross Section of Gassner Cell.

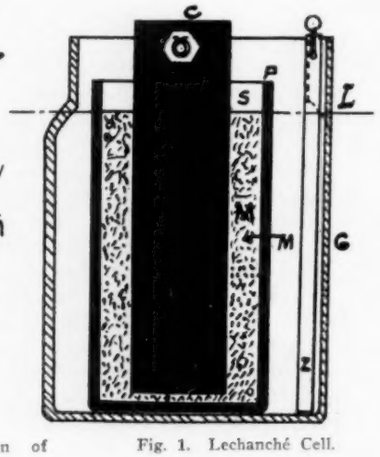


Fig. 1. Lechanché Cell.

The monetary value of a year's production in this country is not far from $10,000,000. The financial importance of the industry is thus considerably greater than the combined value of the four well-known electrochemical industries of carborundum, alundum, artificial graphite and aluminum manufacture. The combined value of the products of these four industries in 1909 was about $6,000,000.

The production of these cells, due to the simple nature of the process of manufacture, is in the hands of forty or more separate manufacturers. The largest of these manufacturers probably makes at least one-third of the total production.

The development of the present type of cell is easily traced from the record of primary cell patents. In the description which follows only those changes will be described that have contributed materially to the improvement of cell construction.

The modern dry cell is an outgrowth of the familiar zincsal ammoniac-carbon (Zn — NH_4Cl — C) cell. The distinguishing feature of this cell is the large carbon pole and the small zinc pole.

To increase the holding-up power of this type of cell, Leclanché brought out in 1868 a cell using manganese dioxide as depolarizer. The so-called Disque Leclanché is the best representative of this kind of cell.

*Metallurgical and Chemical Engineering.

A cross section of one of these cells is given in Fig. 1. The noticeable features of this cell are the reduction in size of the carbon pole; the use of manganese dioxide as depolarizer; and the use of a porous porcelain cup as the container for the depolarizing mixture of manganese dioxide and ground carbon or coke.

The next important improvement in cell construction was the introduction of the Hayden cup cell. The improvements to be noted in this cell are the substitution of a porous carbon cup for the porous porcelain cup of the Leclancé cell as the container for the depolarizing mixture of manganese dioxide and carbon, and the use of a large circular zinc closely surrounding the hollow carbon cup as the negative pole. The small distance between the carbon and zinc poles gives a cell with a smaller internal resistance than any previously made.

After the introduction of the above mentioned cell inventors busied themselves with schemes to render the cell electrolyte unspillable. From the experience gained by many fanciful and dubious experiments the first successful dry cell resulted. This cell was brought out by Gassner about 1883. Figure 2 is a cross section of one of these cells.

The features to be noted in these cells are the use of the zinc pole as the container; the use of the cheese cloth as the container for the depolarizing mixture, and the use of the plaster of paris mixture to render the electrolyte unspillable.

These cells were high in internal resistance, they seldom gave over six (6) amperes on short circuit, and were low in voltage, about 1.3 volts. To improve both of these qualities the present type of cell was developed. Today the majority of dry cells are made according to the cross section of the cell shown in Fig. 3.

This cell consists essentially of three parts:

(1) The negative pole or zinc container.

(2) The paper or porous partition between the positive and negative poles.

(3) The positive pole of two components.

(a)—a *carbon rod* surrounded by

(b)—a *mix* of manganese dioxide, ground carbon, and electrolyte.

The details of construction of these various parts follows.

NEGATIVE POLE—ZINC CONTAINER.

The zinc container is made of sheet zinc; for the ordinary size (2½ by 6-inch) cell, No. 10 rolled zinc 0.020-inch thick is commonly used.

This zinc is tested for lead and iron. One brand in common use tests as follows:

Lead...0.16 to 0.37%	Average	.....0.27%
Iron....0.003 to 0.022%	Average	.....0.013%

The presence of lead in the zinc is not as serious an objection as is commonly supposed, for its over-voltage is enough to prevent local action. In fact lead, if present to less than a certain percentage, seems to benefit the shelf life of the cells. By shelf life is meant the length of time that the short-circuit am-

perage of the cells is over ten. The percentage of iron must, however, be kept low.

The kind of paper in use varies considerably with the manufacturer, some preferring three layers of thin blotting paper while others use a single layer of heavy pulpboard. The paper mostly used is a forty point (0.040 inch thick) pulpboard made up of approximately 75 per cent ground wood and 25 per cent sulphite fibre.

The function of the paper is twofold; a reservoir for the electrolyte, and a means of separating the positive and negative poles. Thus a paper to be satisfactory for dry-cell work must be capable of absorbing many times its own weight of liquid (the ordinary paper absorbs about 150 per cent of its own weight of water) and the pores be so small that the finest particles of the ground carbon will not be drawn through it by colloidal migration or capillary attraction to the zinc pole. If this latter point is not taken care of, a high-resistance short-circuit is formed between the carbon and zinc poles which results in the cell slowly running down even while on open circuit.

POSITIVE POLE.

The positive pole, contrary to the usual idea, is not the piece of carbon that holds the connector, but is all the material that is contained within the paper partition, that is, it consists of

A—A mix of ground carbon, manganese dioxide, and electrolyte.

B—A carbon plug (a plate or rod).

A—The Mix.—The composition of the "mix" as used in the majority of the factories probably does not vary much from the following formula:

Pyrolusite—85% manganese dioxide	100 parts
Ground coke	80 parts
Artificial graphite	20 parts
Salammoniac—NH_4Cl	20 parts
Zinc chloride—10 to 12 qts. 30° Bé	7 parts, approx.

The usual grade of pyrolusite tests over 85 per cent MnO_2 and less than 1 per cent Fe. The most commonly used grades are the Caucasian from the Caucasian Mountains, Russia, and the Japanese from Japan. In the factory parlance these are called Caucasian or Japanese "manganese."

The ground carbon used is obtained by grinding up the so-called retort coke, *i.e.*, the carbon deposited at the top of the retort in gas manufacture by the "cracking up" of the hydrocarbons. Carbon scrap free from copper is also used. In either case the material is freed from iron particles by a magnetic separator. The fineness of the grinding depends upon many factors and is usually different in different factories.

The graphite in use is mostly Acheson graphite Ba_2. A few manufacturers use natural flake graphite.

The best of salammoniac is used and usually tests over 99 per cent NH_4Cl and is free from sodium chloride and sulphate.

The zinc chloride used is that grade employed for the preserving of wood. A sample of this material analyzed:

Zinc chloride	91.6%
Manganese chloride	1.9
Magnesium chloride	1.2
Calcium chloride	1.1
Sodium chloride	0.1
Zinc oxide	2.0
Insoluble	1.5
	99.4%

The function of the various materials of the mix are as follows: The manganese dioxide is, of course, the depolarizer. The ground carbon next to the paper lining collects the current at the periphery of the "mix" and conducts it by means of the other carbon particles to the center carbon plug. The plug thus serves only to connect the mix to the outside circuit. The graphite is used to reduce the internal resistance. The salammoniac is the electrolyte while the zinc chloride is used only to improve the shelf life, *i.e.*, to reduce the local action.

The carbon plug varies in shape according to the fancy of the manufacturer, the various shapes being designed to prevent the plug working loose in the mix. A few of the different shapes in use today are sketched below.

There are various means used to connect to the carbon plug. With plugs of the shape of numbers 1, 2, 4 and 7 in Fig. 4 the connection is usually a brass bolt, nut and knurl. In the case of number 3 the connection is made by drilling a vertical hole in the carbon, filling it with hot solder (*S*) and inserting therein a brass screw (*B*), and allowing all to cool. The solder then anchors the screw; a nut and knurl completes the connector. Numbers 5 and 6 have brass cap connectors which are forced onto the top of the carbon by hammering. Number 6 with a knurl is a common type found on the market. Number 5 is used with the socalled wireless battery box or in any case where a soldered connection is needed. The tops of all carbon plugs are soaked in paraffin to prevent the electrolyte from being sucked up to and corroding the brass connector.

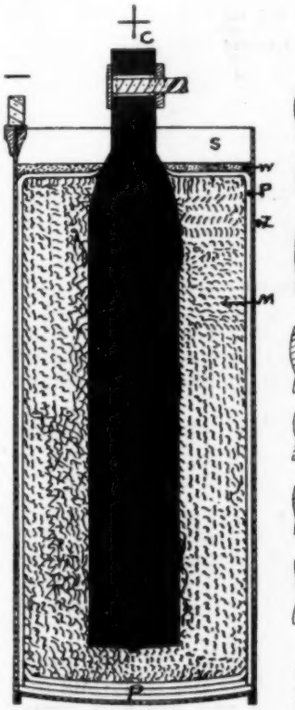


Fig. 3. Present Type of Dry Cell.

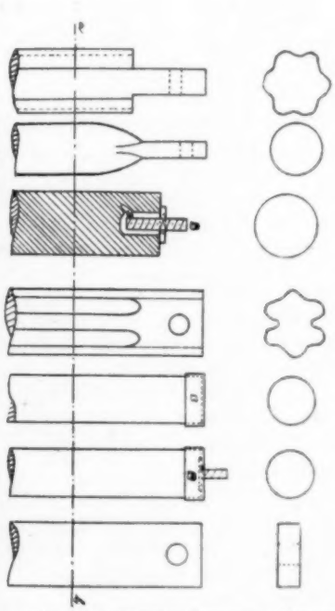


Fig. 4. Different Shapes of Carbon Plugs. All Vertical Views with Exception of No. 3, Which Is a Cross Section, the Upper Diagrams Are Sections of the Plugs in the Mix, Along Line A-B in the Lower Diagram.

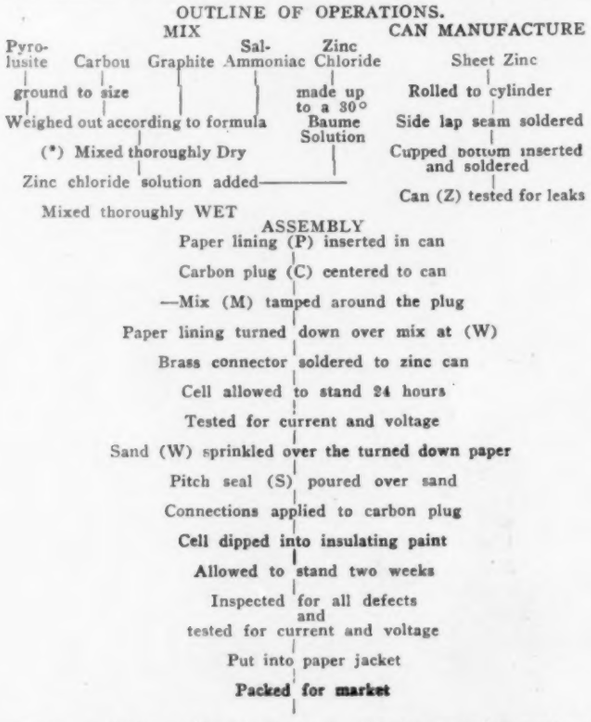
Most cells use a simple brass post and knurl to make connection to the zinc container. Cells made for the wireless battery box have the upper third of the

zinc container formed into threads that screw into the box receptacle.

During the process of manufacture there are a few precautions that need to be taken. No large pieces of metal can be allowed to get into the mix or short circuits will result from torn linings. A small amount of finely divided copper is the worst enemy of the dry cell manufacturer as only 0.02 per cent copper to carbon has been known to ruin a cell in two months. It was at one time supposed that if any solder got inside of the zinc can local action would result. Experiments have proven that there is no such effect. This is explained by the fact that the overvoltage of the tin of the solder is so high that no hydrogen can be liberated on open circuit. Zinc chloride is so deliquescent that on very humid days the mix will take up

PROCESS OF MANUFACTURE OF A 2½ BY 6-INCH CELL

OUTLINE OF OPERATIONS.


MIX
CAN MANUFACTURE
Pyro-lusite
Carbou
Graphite
Sal-Ammoniac
Zinc Chloride
Sheet Zinc
ground to size
made up to a 30° Baume Solution
Rolled to cylinder
Weighed out according to formula
Side lap seam soldered
(*) Mixed thoroughly Dry
Cupped bottom inserted and soldered
Zinc chloride solution added
Can (Z) tested for leaks
Mixed thoroughly WET
ASSEMBLY
Paper lining (P) inserted in can
Carbon plug (C) centered to can
—Mix (M) tamped around the plug
Paper lining turned down over mix at (W)
Brass connector soldered to zinc can
Cell allowed to stand 24 hours
Tested for current and voltage
Sand (W) sprinkled over the turned down paper
Pitch seal (S) poured over sand
Connections applied to carbon plug
Cell dipped into insulating paint
Allowed to stand two weeks
Inspected for all defects and tested for current and voltage
Put into paper jacket
Packed for market

water and the cells go "wet." If the trouble gets too bad the surphur water must be absorbed with sawdust before sealing the cell or the cell is likely to ooze out when put on service.

From the above table it is seen that the greatest item of expense is the zinc container, a reduction in the thickness of which would reduce the service obtainable from the cell.

The total cost as given above is probably the lowest limit to which the cost of manufacture can be pushed under present conditions. It probably represents the cost of about one-third of the present yearly production.

As very little machinery is needed for the manufacture of a dry cell and the cost of the materials per cell is so low, approximately six and one-half cents, relatively little capital is necessary for a small plant. Thus the reason for the existence of the present large number of small plants can be easily understood.

(*)Some manufacturers prefer to saturate hot zinc chloride solution with the sal ammoniac and add the same to the dry mix.
All references in ( ) are to Fig. 8.

ANALYSIS OF COST OF MANUFACTURE.

Materials	Costs Per Pound Cents	Cost Per Cell Cents	Percentage %	
Manganese Dioxide	2.00	1.00	15.8	
Ground Coke	0.75	0.30	4.7	Per-Cent of Material Cost
Graphite	2.00	0.20	3.2	
Sal-ammoniac	6.63	0.66	10.4	
Zinc Chloride	5.00	0.30	4.7	
Zinc (Sheet)	7.50	2.07	32.7	
Pulpboard	3.00	0.15	2.4	
Carbon Plugs		0.35	5.5	
Connections (Brass)		0.80	12.6	
Miscellaneous		0.50	7.8	
Total Material Cost		6.33	= 81%	Total Mfg. Cost
Total Factory Labor		1.50	= 19%	Total Mfg. Cost
Total Manufacturing Cost		7.83		

Maryland Commission News

By acquiring the Reisterstown road, Frederick road, Harford road and Garrison avenue and converting them into public highways the Maryland State Roads Commission has enabled the city to increase its conduit franchise tax from the Chesapeake and Potomac Telephone Company by $7,714.50 this year. The company has the right, under an ordinance passed in 1889, to build its own conduits, subject to a franchise tax only. It was estimated that the tax would amount to $30,000 this year. In his search for additional revenue Deputy Comptroller Childs found that the conduits on the Reisterstown road, Frederick road, Harford road and Garrison avenue were now subject to the tax, because these thoroughfares are no longer owned by private corporations. So instead of amounting to $30,000 the tax will be $37,714.50 this year. A bill for that amount was sent to the company.

The Frederick Board of Trade will carry to the Public Service Commission the question of telephone rates in Frederick county. It is contended that the rates charged by the Chesapeake & Potomac Telephone Company in Frederick county are not uniform for the class of service given, according to some complaints made to the members of the Board of Trade. Chairman Laird of the commission has informed the Frederick Board of Trade that it may bring its charges before the commission and that an early hearing will be given the case as the Cambridge Board of Trade has a similar case pending.

California Commission News

The California Railroad Commission rendered a decision recently granting permission to L. W. Warmouth to sell his telephone system in Tehama and Glenn counties to the Pacific Telephone and Telegraph Company for $4,500.

The town of Mountain View has sent to the railroad commission an order of the Pacific Telephone & Telegraph Company establishing Los Altos, two miles away, as a long distance station and charging for switches. Mountain View's switching privileges have always been limited to a short distance in the surrounding country, while Sunnyvale, its neighbor, has free local service as far as San Jose. Los Altos is to have a switchboard and will be a long-distance toll station.

The commission has ordered a reduction from 30 cents to 25 cents in the telephone rates between San Francisco and Hayward, and Oakland and the towns of Mill Valley, Palo Alto, Redwood City, San Mateo and San Rafael.

Remarks on Telephone Rates

Los Angeles Board of Public Utilities*

VERY much of the annually recurring agitation for readjustment of telephone rates is due to misconception of the demands made by patrons and the cost of the service rendered, in equipment and operating expenses. To an individual, access to a telephone instrument is not much different, in effect, from his ability to draw water or gas from a tap. He is apt to regard his demand at the instant multiplied by the number of his own calls per day as the measure of his tax upon the company's resources. But there are two features in telephone service such as is given in Los Angeles which make the business different not only from gas and water service, but even more complicated than electric service. As with the last named, storage is impossible and there is practically no measured telephone service now in Los Angeles. But electric corporations, although they must hold in readiness sufficient plant for emergency peak loads, and some extra operating cost per unit is incurred in "valley" load intervals, have means of evening up load curves which are not available to telephone companies. And there is no other public utility which makes the same charge for all patrons of a given class, regardless of amount of service rendered. Other companies have at least some chance of saving on valley loads; but the cost to telephone companies is almost practically the same whether the demands are on peak or in valley of their curves. Automatic systems have been devised (and one is now in use by the Home Telephone Company) to overcome this obstacle by caring for such abnormal variations in demand without incurring costs of operators during idle hours. This plan works to reduce expenses and as a gain to the service in capacity and in saving of time.

The custom of making uniform charges for all consumers of the same class necessitates classification of service rendered in accordance with demand upon the plant, and the provision of operating facilities must be made dependent upon this demand.

In some cities, as Los Angeles, maintaining the lowest scales of rates, the grouping of patrons is based upon the principle of averaging revenues, which has no precise bearing upon the cost of service rendered. Other cities, whose rates are commonly much higher, have adopted the method of assessing each class in proportion to the costs of its own service. This is certainly more rational and can be calculated more readily, but it is more difficult to apply in the existing public attitude toward public service.

In Los Angeles the present rating methods are upgrowths, and not out-growths, of rapidly expanding systems of supply. It does not require one foot more of water mains or gas mains to double or treble or quadruple the consumers along a given block, and as the laws require ample capacity to be provided in first instance, increased demand signifies proportionally larger income at much lower rate of cost per unit. One reason why this does not apply to telephone service may be better understood by comparing pipe costs and cable costs.

Thus, let V equal cost of 400 feet of 4-inch pipe laid equal 1.

Then 2.167 V equal cost of 400 feet of 8-inch pipe laid equal 2.167.

But C equals capacity of 4-inch pipe equals 1.

Then $4C$ equals capacity of 8-inch pipe equals 4.

That is to say, roughly, four times the amount of water can be supplied at about twice the cost for distribution.

With telephones, however, cable costs are much more nearly proportional to the number of consumers.

Again, the extension of water or gas mains to points remote from the main operating plant does not necessitate reconstruction or additions to the general distributing system in advance of the securing of adequate remuneration for such changes as may not have been allowed for in original outlay. But, with the telephone each new subscriber entails added expense for connections through to the central office. This is frequently compensated in the rates by extra charges for communication between zones. In Los Angeles no such discrimination has ever been made. Consequently, with the remarkable annual increase of service available to each subscriber and the disproportionate increase of remuneration to the companies, it is inevitable that rates must increase unless some plan be adopted to offset the constant tendency to growth of business. The only practicable method of adjustment is by re-classification of service. And this cannot work otherwise than by shifting burdens, for the additional average cost per subscriber cannot be obviated without changes in the art, which usually involve added outlay besides loss of investment through obsolesence.

The principle of rating most favored has been to tax the traffic according to grade of demand. Where the most prompt and efficient service is required, as in most lines of business, the maximum charge will be exacted, the lowest rate being assessed upon users who can be satisfactorily served with an inexpensive, if less effective, equipment, which makes more moderate demands upon the available service. Here again as with electric current, it is the "readiness to serve" maintained by the company for which each individual customer is expected to contribute his due proportion, in strict accord with the demands made by each upon the particular class of "readiness" upon which he is entitled to make drafts at will.

Not only has Los Angeles a larger percentage of telephones per capita of population than almost any other city, but the demands made upon the service are much heavier per telephone than elsewhere. These conditions arise naturally from the character of the inhabitants, the method of accretion and the plan of distribution. There is also another condition which has not usually been regarded in discussions of rate schedules. This is the very abnormal burden thrown upon the service by the local connections with long distance lines. To a large extent, the traffic layout is responsible. Few cities have such intimate relations with so many outlying settlements and such ease and low cost of telephone communication therewith. And, more or less directly, these conditions very materially affect the feasibility of correctly classifying the rate-payers. There are more

*From the "Second and Third Annual Report," just issued.

kinds of demands than in the general run of cities; but, at the same time, and mainly because of this fact, there are few sharp lines of demarcation among the various classes of subscribers. Certainly the revered but antiquated method in use here of segregating simply "business" and "residence" groups is far from adequate, as viewed from the standpoint of the public or the telephone companies. The party-line divisions applicable to the Pacific Company are more rational, and they afford most valuable object lessons in pointing the moral as to needs along the line in other directions.

But there is much misunderstanding of the relative costs of installing and maintaining the different grades of service. Those who require and demand unlimited service at instant call, should expect to pay the highest rate. Individual connection at will, with a free line may be attainable at lower cost, if the subscriber will tacitly agree to make but few calls per day. If he use such a line at the established rate as freely as he might be entitled to use a so-called "business line, the tax upon the company's resources is not fairly compensated by the special rate paid.

With needs which can be fully met by a party-line, selective service, one may still have free line communication, subject only to such delays as may be caused by waiting for the line to clear. With non-selective service, a still lower rate can be applied, because the limitations are such as to make the use less free and satisfactory.

There is a very important and unsatisfactory consideration which arguments with the diversity of classification. A patron, for instance, who has a business telephone, for which he pays the highest rate, needs communication with a residence. With one company he can reach the individual over an independent line and lose little time in transacting business. Another, who has a selective party line may be fully as accessible at the moment, but chances are largely against this. It costs him in valuable time and inability to transact business often more than the monthly cost of efficient service. But the charge to him is increased largely because of the reduced charge to his customer. In other words, reduction of rates (in this class of instances) benefits one telephone patron at the expense of patrons of the merchants. The fault lies in the principle of classifying telephones wholly on the basis of the use of the mouthpiece of the instrument, without regard to the ear-piece, or receiver.

The attempt to remedy this by measured service has perhaps not had a fair trial in Los Angeles. The opposition to it has been sufficient to practically abolish the system here. In the face of its greater success in other cities, it would appear that the experience in Los Angeles may be somewhat abnormal. We have given enough study to the subject to become convinced that the cause is the very excessive demands of local telephone users as compared with the burden thrown upon the service elsewhere. The message mileage and the calls per instrument are here at the maximum thus directly enhancing cost of equipment and service, whereas the rate per call and compensation per unit of distance are very much below the average requirements throughthe United States. This is partly due to density of population, which is low in Los Angeles, and partly to distribution of subscribers. And another very serious cause is the excessively high percentage of non-remunerative service rendered by the Los Angeles telephone systems.

Thus, in a city like Chicago, or Buffalo, where about one in each ten of the inhabitants is provided with a telephone, the average number of feet of wire per subscriber is much less than in Los Angeles, because of the greater density of population in the other cities named. In Los Angeles, with about one in five of the inhabitants renting telephones, the wire mileage averages much higher because of the larger area over which the service is spread. And this feature has another bearing which is but rarely considered or understood by patrons. The distribution of business houses and the relations of residence districts thereto vary greatly in different cities. In Los Angeles the use of residence telephones for quasi-business purposes and the extensively large proportion of unpaid calls make heavy demands upon the systems which are not compensated in any manner in the rate schedules.

There is undoubtedly much misunderstanding of the issues involved in the annually recurring controversy on telephone rates. Many persons appear to believe that the rates are fixed upon the endeavor to provide income sufficient to pay interest or bonds and given dividends upon the stock issues of the companies, without due regard to the outlay in money required to equip and operate the plants. This is wholly erroneous. The actual necessary investment in plant, as determined by detailed appraisals, and careful consideration of what is essential, are the criteria for establishing the rates. Heretofore there has not been vested in any board or other civic authority in California any power to regulate the issue of stocks and bonds, and it is necessarily assumed in the rate-making, that the intrinsic value of these is exactly equal to the legitimate cost of putting the company in position to render efficient service.

Even the market value of securities is regarded, except as a possible check upon the inventories, usually of little value, except in one particular. From a knowledge of the amount of actual cash realized from the sale of stocks and bonds, the actual expenditures may be deduced. But the liabilities incurred in floating securities, if greater than might be reasonably incurred under the circumstances, are not regarded as a just claim upon the rate-payers to make good. Nor is any allowance made to the company for expenditures actually made above a reasonable cost for the installation acquired.

If, therefore, any company has issued bonds or stocks in excess of its necessary costs, it cannot continue in business and meet its obligations in excess of legitimate outlay upon the rates prescribed by the Board of Public Utilities. And eventually, any settled market price of such securities must necessarily reflect this condition of affairs. Otherwise this market price would be maintained practically at par.

The control by a state board of the issuance of securities, based, as it will be, upon actual values, upon which the rates are now fixed, will not in any manner affect the rates themselves, although it must eventually make these securities themselves a tentative criterion for checking appraisals of property.

INTERCHANGED TELEPHONE SERVICE.

The existence of two competing telephone companies in Los Angeles is the result of conditions of the past which, at the time, appeared to justify this outcome. In any honest attempt to effect consolidation, if such be really a desideratum, it is necessary to properly consider this fact. Moreover, the two systems are different in principle of operation, in voltage of current used and in

relations to long distance service available. These considerations are all important in the discussion of the feasibility of joint telephone service of whatever design.

Much agitation of the subject has appeared to be based almost wholly upon the theory that rates might be reduced or other advantage gained by such interchange of service as would enable anyone renting from one company to get free communication with the subscribers of the other company.

In other words, a patron who now has communication rights with 40,000 subscribers desires equal freedom of communication with 40,000 other subscribers of another company. With those who now pay rates for two telephones, it is assumed, of course, that one instrument would suffice for the double accommodation. That this result could not follow with a very large number of subscribers is clearly evident; for these now require many trunks and instruments from each company in order to transact their business. And it is, in such cases, almost equivalent to doubling service to have both systems in use at the same time. So, with these patrons, there would be no economy in cost and a decided loss of time, or else added cost, to transact all business through one medium.

With those who would need but one instrument if 80,000 subscribers were at call, no doubt there might be some advantage in connecting through one system; but the available service in this case could not be placed at command without some proportionate increase in the rates, even if the service were rendered by one company. This would simply mean that the chances of finding the subscriber's lines occupied when needed would be increased in much larger degree than the extension of the available service.

Again, the increased demand upon each company by reason of the joint service must entail increased outlay for equipment as well as expenses of operation. This would practically double rates all around, making it impossible to meet the needs of such as are now served by one company only.

Various schemes have been suggested (none have ever been presented in business shape with specifications in detail) for some kind of limited interchange of telephone service, but all are based upon inadequate conceptions of the real service rendered by telephone companies and of the readiness imposed upon them by patrons.

It is feasible to provide for interchange service as between the two companies. This is accomplished within due limits by the long distance toll service. But this is slow, and useful only for urgent messages. And, besides, it does not tie up the local lines while awaiting connection, as would be the case in city interchange service. The cost of such service to the patrons must be measured by the cost to the company, and this will, of course, depend upon the amount and character of the service

It has been proposed to install a special exchange with a limited number of trunks, affording this class of service to a certain number of special subscribers, paying a monthly rate. If, as in long distance connections, a time limit were put upon conversations, the best estimates give only 20 subscribers for each double trunk between the two systems to insure a reasonably free line, and it will require at least 200 trunks of each system to care for the duplicate service now installed. On the basis of rough estimates of rates suggested for interchange subscribers the cost to each could not be reduced except by the absurd plan of charging taxpayers with the outlay for equipment and the interest on investment, depreciation, etc. And this allows absolutely nothing for the added cost to the companies, etc.

Let us suppose that 4,000 subscribers pay $1.00 each (as proposed) per month to the city for interchange service, thus displacing 4,000 instruments which one or other company subtracts from service. This means no reduction of operating costs to the companies. On the contrary, the new service entails heavier burdens in service. Therefore this is practically taken from net income. Forty-eight thousand dollars per annum represents about five per cent of proper net income for both companies. The actual cost to the companies, however, in addition to this loss of revenue, would be such as to demand annually from the rate payers the further sum of about $190,000. Thus (190,000 plus 48,000) $238,000 per annum must be added to the rates, or more than eleven per cent if distributed all along the line. Of course, the extra service is worth much more than this, but the subscriber pays really $286,000 additional, including what goes to the city for interchange. If he pays the full cost to the city, the advanced rate will be much higher.

The foregoing calculation being based upon limited service, it is evident that the eleven or twelve per cent increase in revenue must all come from the 4,000 subscribers benefited thereby. This will be equivalent to 110 per cent increase in their rates, in addition to the city's charge. Therefore they would pay more for inferior service than they now pay for the use of two instruments.

The more one studies the subject the more apparent is the fact that nothing short of complete interchange for all subscribers is economically feasible. And this quickly resolves itself into a case of inefficient makeshift for consolidation of service, with much greater cost, and complications in operation which are not compensated in any manner in the interchange plan.

A very common but erroneous notion is often expressed by those who do not sufficiently regard the nature of the telephone service and the requirements for effective use thereof. Decisions of the courts are quoted bearing directly upon railroad traffic, where a certain interchange is made obligatory by law. No such decisions have been rendered in pure telephone suits where the real issues have been akin to what we are now considering. The difference may be illustrated thus: A railroad company may be required to receive and transport over its lines such freight as may be properly delivered from a connecting line; but a demand to permit the connecting line to run its own trains over the road on its own schedule without compensation or any notice given could not be sustained.

The interchange of service contemplated by law, and which is commonly practiced in long distance service, is the transfer of messages received from one company to and over the lines of another company by means of the latter company's facilities and by operation of its own agents only. This has been effected by viva voce repetitions of messages, but the method has been found unsatisfactory for various reasons. To be of enough practical use to enable free interchange among subscribers of both companies involves costly outlay which becomes prohibitive long before general application is secured. And it is impossible to estimate costs and consequences until the extent of the demand has been ascertained by actual experience.

Court Dissolves Telephone Injunction

All legal obstacles to the completion of the merger of the Home Telephone Company and the Pacific States Telephone and Telegraph Company were removed recently when Judge Trabucco, sitting in Department No. 11 of the Superior Court at San Francisco, Cal., ordered the injunction against the purchasing company dissolved.

This leaves the Pacific States Company free to proceed with the dismantling of the Home telephone plant without interference from the courts. It may remove the automatic type of telephones and substitute the old-fashioned instruments in their places, and in general deal as it sees fit with the physical properties of the acquired company.

Although the Pacific States Company has insisted on its willingness to give automatic service to those customers who still desire it, the automatic instruments will probably be retired as rapidly as possible. The Pacific States Company claims that the automatic instruments were not an operative or financial success.

O. L. Scott and others filed the original suit against the purchasing company, alleging that its purpose was to force users of the automatic telephones to exchange them for the old style instruments and that the purchase violated a charter provision. Pending the final settlement of the suit Judge Lawlor issued an order on a showing made by Scott restraining the Pacific States Company from dismantling the automatic instruments. It was this order which Judge Trabucco, who, sitting for Judge Lawlor, dissolved.

Judge Trabucco's decision was given in the form of a verbal opinion from the bench. It was followed by a written opinion. In discussing the matter Judge Trabucco stated that he had consulted legal authorities on the question at issue and that he had found the defendant company to be legally in the right.

Ideal Atmosphere for Telephone Employees

When the apparatus has been installed, the contracts for which have just been signed, about fifty of the employes of the Citizens Telephone Company of Grand Rapids, Michigan, will work in rooms so tightly closed that not a breath of outside air can get in. The windows will be double and all crevices and cracks will be tightly calked and the doors will be as closely guarded as the windows. And in this hermetically sealed room the fifty employes will enjoy atmospheric and climatic conditions that will come as near to being ideal as it is possible to make them.

The new apparatus is for the switch and toll rooms. The air for these rooms will be fanned into the attic and passed through sprays of water to be thoroughly washed of all impurities. The air then will pass over coils which will warm it in winter and cool it in summer. From the coils it will pass through the dehumidizing machine, which will take the moisture out of it when the percentage is too high or put moisture in when too dry. Then it will go into the switch and toll rooms for use. The apparatus will produce air that will not vary five degrees in temperature or humidity no matter what the outdoor conditions may be or the season of the year. It will be free from impurity up to 98 per cent.

The Citizens' Telephone Company has had much trouble in the switch room by reason of dust and humidity clogging the delicate mechanism and interfering with its operations. The trouble has been especially annoying during the last summer owing to the continued wet weather. The new apparatus will be shut out and the temperature and humidity will be maintained at a level the year around. The contract cost of the apparatus is $5,895 and it is expected the installation will be completed in March. The American Blower Company has the contract.

Nebraska Commission News

The city of McCook, Neb., has filed a reply brief with the state railway commission in the matter of its application for a reduction of 33 1/3 per cent in the rates charged by the Nebraska Telephone Company. The state railway commission will soon decide the case and it is understood that the decision will be used as a precedent for the establishing of rates for the Lincoln and the Bell companies which have merged their interests in a large part of the state of Nebraska.

The present rates at McCook are as follows: One party business, $3; two party business, $2.75; one party residence, $2; two party residence, $1.50 a month.

The city argues in its brief filed with the railway commission that the company's estimate of the probable income from these four classes of service is $12,000, and $16,000 from all sources of revenue. The city says a reduction of 33 1/3 per cent on the four classes of service would produce a reduction of only about 25 per cent on the total McCook income.

The company alleges that 4 per cent is a reasonable rate of return, although in one of the orders issued by the state commission it is stated that the commission believes three per cent over and above the prevailing rate of interest on money is the proper return for the risk of persons who invest in public service corporations.

The Nebraska Telephone Company at Omaha, has been allowed to issue $1,313,000 of additional stock. It has outstanding already $4,687,000. The application does not say what specific purpose this stock is to be sold for.

Airline Toll Schedule in Washington

There has been filed with the Washington State Public Service Commission by the Pacific Telephone & Telegraph Company a tariff based on a statewide airline mileage charge which, says the commission, assumes great importance in that it is an entire departure from the inconsistent theories on which the present long distance telephone rates are based.

The tariff covers the business of the company throughout the state and names a basic rate of five mills per airline mile with a terminal charge of five cents, on a one-minute schedule, with 50 per cent additional tolls for each minute or fractional minute overtime. A basic rate of six and one-fourth mills on a two-minute schedule is named, with a terminal charge of five cents and 50 per cent additional for each minute or fraction of a minute of overtime. Permission is asked by the company to put the tariff into effect March 1, 1913. What purport to be comparative statements of the rates and revenues covering the business from various exchanges and the rates and revenues that would ensue from a like business under the rates proposed in the tariff just filed accompany the tariff.

The Law and the Telephone

By E. J. Wenner

LIABILITY FOR INJURY BY LIGHTNING—USE OF APPROVED LIGHTNING ARRESTERS—WARNING—ACT OF GOD.

WITHIN the last several years and since the telephone has come into general use injuries to patrons are quite frequent, and occasionally we hear of a person injured by lightning while using the telephone instrument. It becomes important to telephone companies to know under what circumstances they are liable to the patron for the injury sustained.

In a recent case the rules of law are discussed and they are applied to facts which are somewhat peculiar. The plaintiff was a newspaper reporter and went to the Philadelphia Country Club to report a polo match. After dinner and at about eight o'clock he left the dining room and went to the telephone pay station, which was in a booth in the building, to communicate with his paper. After he took the receiver from the hook and asked for the desired number he received a shock and was severely injured. He brought action against the Bell Telephone Company to recover damages, claiming the defendant guilty of negligence in not properly protecting its telephone instrument against shocks of electricity, and in failing to post a warning admonishing patrons against using the instrument during a thunder storm.

The evidence of the plaintiff and his witnesses showed that a severe electrical storm started at about 8:10 in the evening and continued for more than an hour. It was also shown that at the time of the injury there was "a frightful, blinding flash of lightning," so severe that people sitting at tables on the veranda believed the club house had been struck. This was instantly followed by a crash of thunder. The plaintiff testified to his injuries and made plain that he was unconscious until the afternoon of the following day. He also testified that there was no sign on the telephone warning persons against using it during thunder storms. The defendant claimed it had placed an instrument or device on the telephone calculated to prevent the discharge of electric currents during an electric storm into the telephone. Several witnesses were produced, who showed by their experience and technical knowledge, a familiarity with the lightning arrester in question, and they testified that it was a standard protection device, and, at the time of the accident, the best in general use and the most efficient known to the scientific world for protecting a telephone from outside or abnormal electrical disturbances. The same witnesses testified that there was no known device, which would absolutely prevent lightning entering into a telephone. The defendant also showed by uncontradicted evidence that the device on the club house telephone was in proper working order, and had actually operated at the time of the accident.

The plaintiff recovered in the lower court, but upon appeal the finding of the court below was reversed. The supreme court decided that the plaintiff's action was grounded upon negligence, and that he had failed in an effort to establish the defendant guilty. The plaintiff's evidence clearly showed that the accident resulted from lightning, but did not establish negligence on the part of the defendant in its duty to protect its patrons. The upper court held that the injury was the result of an act of God. The shock was produced by atmospheric electricity and not by an electric current within the control of man. There was no other and contributing cause and clearly no negligence on the part of the defendant, as it showed it had used the most approved methods known to science for preventing accidents of this kind. The court distinguished between cases wherein the injury was a direct result of an act of God and those wherein an act of God and other contributing causes, which might be charged to a defendant as negligence, caused the injury.

With particular reference to defendant's failure to post a danger warning the court used the following language:

> It is contended by the plaintiff that the failure of the defendant company to place a warning on the telephone against its use during electrical storms was evidence to submit to the jury of the defendant's negligence in the management and operation of the telephone. We do not regard this contention as tenable. It overlooks the well-settled and oft-repeated rule in this state that the test of appliances is the ordinary usage of the business. One cannot be convicted of negligence if he employ in his business the methods and appliances in general use by those engaged in a like business; on the other hand, if he fail to use such methods and appliances, and an injury results therefrom, he may be required to convince a jury that his methods and appliances were of equal or superior merit to those in general use. If a notice or warning not to use the telephone during a thunderstorm can be regarded as an appliance or equipment, it does not appear, and the plaintiff does not attempt to show, that such a notice has ever been placed by the defendant or any other company on its telephones. It may be common knowledge, possessed alike by the plaintiff and the public, that it is dangerous to use or be near a telephone or any other good conductor of electricity during a thunderstorm; but it is equally well known, and the contrary is not disclosed by the evidence in this case, that telephone companies do not ordinarily place signs on their telephones containing such information.

William H. Rocap *v.* Bell Tel. Co. of Philadelphia, *230 Penn. 597, 36 L. R. A., N. S. 279.*

DUTY OF TELEPHONE COMPANY—APPROVED APPLIANCES—REASONABLE PROTECTION.

A telephone company deals with a dangerous agency and it is bound to exercise the highest degree of care to protect its patrons from a dangerous electric current, which may come over its wires from any source. It is bound to use the most approved means of protection known, and it must exercise such protection as a man of ordinary care and prudence would use in selecting and using the best methods known to science, for the prevention of injury to its patrons.

Where there is no protective device attached to a telephone, nor no ground wire, or where the telephone wires are allowed to sag against or lie upon high current wires, or where instruments are removed and the wires left upon the premises unprotected, and an injury occurs therefrom, it is liable.

It is the duty of a telephone company to make actual and necessary inspections of its wires and equipment, and if the insulation becomes removed and contact with high power wires result, any damage caused thereby is properly chargeable to the telephone company.

Delahunt *v.* United T. & T. Co., 215 *Penn.* 241; Texas T. & T. Co. *v.* Scott, 127 *Southwestern Reporter* 587; Southwestern T. & T. Co. *v.* Abels, 126 *Southwestern Reporter* 724; Bardon *v.* Northwestern Telephone Exchange Company, 93 *Minnesota* 421.

DANGEROUS GUY WIRES—INJURY TO TRESPASSING CHILD—WARNING—LOCATION OF POLE—FAILURE TO WATCH CHILD.

Though the case hereinafter digested does not deal with a telephone company, the rules of law as laid down by the courts apply with equal force to a company engaged in the transmission of messages by electricity. The questions involved deal with dangers from electric currents, and the circumstances might easily be the same in case the wires in question were owned by a telephone company.

The plaintiff as administrator brought suit against the defendant claiming damages on account of the death of a six year old child. The defendant is charged with negligence in that it maintained upon or near its premises, a pole from which was suspended a loose or broken guy wire which came in contact with the high tension power wire and killed the child who was playing about the pole and swinging upon the broken guy. The pole in question was upon premises adjacent to the ground owned and controlled by the defendant company, and the pole in question had been used by the defendant in the transmission of electricity. The children of the neighborhood had been accustomed to playing about the premises and the pole and for some time had been amusing themselves by swinging upon the broken wire.

The defendant contended that the child was a trespasser and that it owed him no duty, except that of restraint from wilful injury. It contended further that the pole was off the premises of defendant and upon property which had been rented to the father of the dead boy. It also claimed the father and the mother of the boy guilty of contributory negligence, and on that ground asked to be relieved from liability.

The evidence disclosed that the child with others had been playing upon the premises, and that defendant's watchman had told the children to stay away from the pole. Nothing more was done by him, however, and the children resumed their playing. It would have been easy for the defendant's employee to cut the guy wire and render the playground perfectly harmless. The court held upon this phase of the case that the defendant's duty was to protect the ground in question and that a warning such as was given did not act to relieve it of responsibility. If, however, such an admonition had been given to an adult, or one who might have fully comprehended the dangers in question, relief might have been granted the defendant.

Concerning the location of the pole, the court said that liability was not dependent upon whether the pole was on or off the premises, which it had rented to the father of the decedent. It was shown beyond question that the pole was not rented to him and that the absolute control was retained by the defendant. Decedent's father did not have charge of the pole and had no authority to remedy any defects in or about it. The defendant only had the right and it was charged with full responsibility for its dangerous condition.

The courts said the action was not affected by defendant's claim of contributory negligence on the part of the parents of the deceased. The evidence showed the father to be away from home during the entire day, and that the mother was usually busy taking care of her household duties. "Under such circumstances it cannot be held as a matter of law that these parents were negligent in permitting their six year old boy to go out in the yard to play without constantly watching him. If such a rule should be adopted, a large majority of the mothers would be forced to keep their little children in the house, or else be responsible for any injury suffered by them at the hands of others."

In the course of its opinion and with reference to the fact that the pole in question was an attraction for children, the court quoted from the case of Price *v.* Atchison Water Co., 58 *Kansas* 551. In that case action was brought against the defendant on account of the drowning of an eleven year old boy in defendant's reservoir. A fence had been maintained, though there was a stile over it, and defendant had knowledge that boys had been crossing the fence fishing in the reservoir and indulging in other sports. The quotation is as follows:

> To maintain upon one's property enticements to the ignorant or unwary is tantamount to an invitation to visit and to inspect and enjoy; and in such cases the obligation to endeavor to protect from the dangers of the seductive instrument of place follows as justly as though the invitation had been express. * * * It would be a barbarous rule of law that would make the owner of land liable for setting a trap thereon, baited with meat, so that his neighbor's dog, attracted by his natural instincts, might run into it and be killed, and which would exempt him from liability for the consequences of leaving exposed and unguarded on his land a dangerous machine, so that his neighbor's child, attracted to it and tempted to intermeddle with it by instincts equally strong, might thereby be killed or maimed for life. Such is not the law.

From the above it will be seen that it is the duty of a telephone company to carefully inspect its poles and wires, especially its guy wires, to avoid all chance of injury because of contact with high tension wires. The case above referred to is that of Ferrell *v.* Dixie Cotton Mills (North Carolina), 73 *Southeastern Reporter* 142, 37 *L. R. A., N. S.* 64.

Telephonic Address to Aid Telegraphic Delivery

The postmaster-general of Great Britain has issued a notice reminding telephone subscribers of the existing facilities for securing, by the use of the addressee's telephonic address, the expeditious delivery by telephone of telegrams to telephone subscribers. This address consists of the subscriber's name, the name of his exchange, the number of his line and the name of the town in which the exchange is situated. When the name of the exchange is also the name of the town, or of a well-known locality, the name of the town may be omitted. The name of the town is not required when a telegram is addressed to an exchange number in the same town. Subscribers are recommended to print their telephonic addresses on their notepaper as their addresses for telegrams. Confirmatory copies of telegrams delivered by telephone will be sent by post without charge to the address in the telephone directory in daily batches, and, if the attention of subscribers cannot be obtained by telephone, telegrams will be delivered in the ordinary way by messenger.

The secretary of the Telephone Pioneers of America has removed to larger quarters at Number 30 Church street, Room 730, New York, at which place the secretary will be glad to receive any Pioneers visiting the city.

DEPARTMENT of RAILWAY TELEPHONES

Getting Telephone and Telegraph Together

By Angus S. Hibbard

Address before the Association of Railway Telegraph Superintendents' last annual convention.

THE wire communication business of America can be greatly extended and improved if the people who own and operate the wires and systems of communication can get together and co-ordinate their plans and their services to the extent that the service requires—that the demands of the public require, and to the extent that will develop a greater and better telegraph as well as a telephone business. This move has come along at the same time as the change over thousands of miles of line from the telegraph to the telephone in the handling of trains and in the handling of the commercial business. A telephone man today does not have to say that he can transmit messages by telephone. You have proved that that can be done, and are doing it today more extensively probably than it has been done anywhere. Still, it has been tried out in other countries. The English government is using telephones in hundreds of its offices for transmission of commercial messages. Now another thing has come along which is a factor in the business performed, especially in the handling of commercial telegrams at the small towns. The Interstate Commerce law has come along with its restrictions, under which it is necessary for you in hundreds of cases to shut up the telegraph office for several hours during the day. You really can't afford to open it. There is no answer at all. Under the circumstances we have simply got to shut up the shop, and the telegraph office is out of business for long periods, at noon, evening and night. It is Mr. Vail's idea that a telephone exchange which is open day and night, in a small town as well as a big town, may be utilized to supplement the existing telegraph office, sometimes being a branch of a railroad office, sometimes the railroad office a branch of it, and keep an open telegraph office for the public, so that the Western Union company can have a 24-hour telegraph service, and if the railway operator is away, the telephone operator can take the message and it can be handled sometimes by telegraph and sometimes by telephone. The facts are that the American Telephone and Telegraph company has on hand in all of these places a force of people and a plant of wires, and the means of handling this business, all of which we are trying to utilize. At the same time there has come along the effort of the telephone and the telegraph company to increase the commercial business by the receipt of telegrams over the telephone, and to expedite it by delivery in the same way. I can well understand that perhaps, to the superintendent of telegraph, the idea may occur that the advertising of this particular service will put upon agents, at railway stations, duties that are hard to perform, and the situation will be a difficult one. Now, the condition is this: At all of these places we are doing a commercial telegraph business over the counter anyway, and the taking of telegrams over the telephone is not entirely new. It is not the invention of the past year or two, but has been going on for thirty years, with a few large customers, more or less, and hundreds of operators have been for many years getting telegrams over the telephones and delivering them that way, so that no entirely new business is going to be thrown upon them in a tremendous amount or volume, but that class of the business is increasing. The public is appreciating it, and some railways which, under their contracts, have a direct interest in the commercial earnings of the Western Union, are providing for every message which may come over the telephone just as well as over the counter.

Now, all of these things are focusing at about this time. Opening up of joint offices is going on. In New England, I think, we have upwards of one hundred commercial telegraph offices opened in the telephone exchanges, and in the same towns the railroad offices remain. It

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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has not altered the situation, except that the railroad operator is relieved to some extent of the work of receiving messages and delivering them, and whether or not the railroads are financially interested to a great extent in the earnings, it has been possible to improve the conditions of the telegraph company, and this has been worked out case by case. In other districts the same thing will apply, and some superintendents of telegraph may think that this telephoning of telegrams is to be boomed and will increase the duties of the agent and operator so that perhaps they can hardly handle it, but, as I say, it seems to me that this is in a transition period. If at any place the work is a burden, the probabilities are we shall have another telegraph office in our telephone exchange that will finally rid the railway office of about everything except the business that may be passed over the counter.

On the telegrams which you receive by telephone, the telegraph company has arranged with the telephone companies to collect bills and act as fiscal agents, and just as far as possible to simplify and make easy the work of the telegraph operator, whether at a railway depot or in a telephone exchange, extending this service to all customers. This can be worked out, and as far as it has gone it has worked pretty well. There have not been any bad breaks in it, and the railroads assume no increased financial liability.

At the same time, another thing in a way is focusing about now. We find in a town where depots are closed for two or three hours at noon, sometimes necessarily so, that the business man is all out of joint with the telegraph company. He is complaining because he is unable to send telegrams out of town when he wants to. At hundreds of these points the telegraph company is a partner with you in the ownership and maintenance of a commercial telephone circuit, and our people would handle all of the commercial messages in and out of the little town if we could get at this circuit. The key is in the pocket of the station agent, and he has gone home to dinner, or to tend his garden. I don't know what he is doing, but he is gone, and there is nothing doing in the way of telegraph business.

Now, it would seem to me, and it seems to others with whom I have talked, that a possible way out of this bad condition is to work up a scheme under which, during the closed hours of such a railway station, the commercial circuit will be tapped into the telephone office; not into the exchange board, but into the office, just as if it was a Morse line, and if a telegram is offered during these hours it may be handled over the commercial circuit at a way point from this Western Union office operated by the telephone company, just as it is now handled at the terminals of the lines, as the terminals extend into the telegraph office in almost every case where commercial messages are handled. This is a subject which the telegraph company is taking up with you, and hopes to develop as a means of providing an all-day telegraph service in these communities. We hope it will popularize the telegraph. We hope it will show the public that we can give a dependable, all around telegraph service, without putting a burden on anybody. All that we ask especially is, that if any of these arrangements, as they come along, seem a burden to you on your railway lines, or to your agents or operators, that you take the matter up with the telegraph company, so that we may have a chance to talk it over together. What we ask is co-operation in the endeavor to give a better telegraph service on a reasonable basis of operation.

We are also taking up with the telephone companies all over this country the matter of maintenance of lines, which is, I am sure, something that interests all of you.

The telephone companies have maintenance men distributed over every 10 or 15 miles, all over the United States. They are planted in ones, twos, tens, fifties and hundreds. It is a great organized force, handling an enormous wire plant. The study is to take advantage of these forces so that we may also maintain telegraph wires, all of the combined wire plant, better than we ever have before. I think we can do it with the co-operation of you gentlemen here, which we fortunately have been having, and for which we thank you. We are working out very interesting things along the lines of our plant, and equally so along the lines of our operation, and if in the telephone operations we may have the benefit of your suggestions and your co-operation and help, I am sure we will all pull together in bringing out a tremendous improvement of the telegraph service and a better operation of railway wires because what will benefit one will benefit the other. It ought to come; it may be made to. It is a work which is very interesting and I feel sure that we have made a good start and have had the co-operation of all you gentlemen and our desire is to co-operate and help and assist in working out these problems which will be mutually very beneficial.

Canadian Pacific Adopts Telephones

Telephones are now being used throughout the main line system of the Canadian Pacific Railway company for dispatching trains. Installation on the last division between Vancouver and North Bend was completed about the first of December, and was the last link to be hitched up between the Pacific coast and St. John, N. B. Of course, no telephone is needed between Winnipeg and Port Arthur, where there is double track, since orders are not so many where all trains in one direction occupy one track.

Dispatching by telephone was effected on the division between Kamloops and Field, in British Columbia, and then the division between Kamloops and North Bend was fitted up. On both of these divisions operation was begun immediately after installation.

It is a significant compliment to the telephone, says *Telephone Talk*, that it should be used by such a large and comprehensive railway system as the Canadian Pacific railway in preference to the telegraph which has been in use. The reason for this is that it has been proven that not only are mistakes less liable by using the telephone for dispatching, but much more work is accomplished. When the first experimental section between Montreal and Farnham, a distance of sixty miles, was installed six years ago, the man in charge of the work being Mr. J. F. Richardson, superintendent of Canadian Pacific railway telegraphs in Vancouver, it was shown that one operator could dispatch 86 trains in eight hours. These messages were sent to three offices and repeated back. That

meant that a train was dispatched on an average of every five and a half minutes during the whole of the time. Such work would be a physical impossibility by telegraph. It meant, too, a great saving in the time of trains, much delay being obviated.

Because of such excellent results as these, the railway company decided on the installation of the telephone system on its entire main system. It meant laying two extra copper wires the whole length of the main line, involving heavy expense. On the section between North Bend and Vancouver copper wire weighing 210 pounds to the mile was strung. This is much heavier wire than is ordinarily used for telephoning.

"Information" Gives Train Time at Keokuk

Through the Industrial Association officers at Keokuk, Ia., arrangements have been made which enable the public to secure more prompt information as to the time of arrival and departure of passenger trains.

Since December 2, the time of arrival and departure of the trains has been received at the information bureau of the telephone company and it is no longer necessary to call the Union station to secure desired information as to the trains.

At train time the men in the office at the Union station are busy selling tickets to the public and have no time to answer the telephone calls promptly. The telephone at the Union station rings from fifteen to thirty times before almost every train is due and always while a crowd is around the window.

A member of the Industrial Association who noticed the condition at the station suggested to President Joy that some arrangement could be made with the telephone company to furnish the information for the public. This would not only relieve the men at the station, but would enable the public to secure the information more promptly. The operators at the station receive their first word as to whether or not a train is on time about two hours before it is due. They immediately communicate with the telephone office and keep the information bureau informed from time to time as to any change from their first report.

It is to be understood that this applies only to information concerning train time and no other information concerning tickets, etc., can be given.

Chicago and Alton to Install Telephones

One of the latest railroad systems to join the ranks of those using the telephone for the dispatching of trains is the Chicago and Alton, which has recently placed an order with the Western Electric Company for the equipment necessary to install its first circuit. The selective system of operation will be employed and will be similar to that now in use on the lines of the majority of the large railroad systems of the United States and Canada.

The equipment to be installed will consist of the No. 102-C relay type selector set which contains the standard No. 50 type Western Electric selector. The way stations will also be provided with standard telephone set equipment and a complete wire chief's testing equipment will be furnished for the dispatcher's office.

The circuit to be equipped extends from St. Louis, Mo., to Bloomington, Ill., a distance of approximately 160 miles, with the dispatcher located at Bloomington. The number of way stations to be provided with selector apparatus is thirty-six.

Canadian Commission News

The Canadian Bell Telephone Company won the main point fought for in the recent inquiry before the Railway Commisson, granted at the request of the Montreal City Council. The inquiry lasted three or four days. The city asked that the price of business telephones be reduced from $55 to $50 and of private houses from $35 to $30. This is refused on the ground that the city annexation and the developing of territory have placed such a heavy strain on the Bell Telephone Company's capital to meet demands for extensions that they are entitled to some compensations. The company's request, however, to charge these prices for the old "Blake" telephones as well as for the new ones is refused. The price will be $5 less. The demand that in pay telephones no money should be extracted until the person desiring to speak is placed in communication with the person desired is refused.

The railway commissioners decide for the city on the point of prices to be paid by part of the newly annexed municipalities on the Back River. After the New Year people in these municipalities will pay city rates for their telephones. This decision is based on the fact that Montreal West pays the ordinary city rates. Therefore Montreal West is made the basis, and outlying municipalities for a distance from the old limits of Montreal corresponding to that of Montreal West will get the city rates. This is in answer to a demand of the city that the company's tariff imposing $5 for each additional quarter mile in Bordeaux, Ahuntsic, Longue Pointe and St. Lambert should be abolished.

Wisconsin Commission News

In response to an application of the Boscobel Telephone Company, the Wisconsin Commission has ordered a physical connection between the petitioner's system and the lines of the 20 companies named as respondents in the case. Until recently the Boscobel Company has been furnishing switching service to the respondents, from which it has received little remuneration. The case was brought to the commission upon the failure of the companies to agree upon terms and conditions. A yearly charge of $1.50 was ordered by the commission, which charge is to apply to each rural telephone which can ring the Boscobel central directly. The Union Telephone Company of Prairie du Chien has been authorized to establish a switching charge of $2.50 per telephone per year.

The Matteson Telephone Company, operating in Shiocton and Welcome, was directed by the railroad commission to discontinue its present rates to patrons and make material reductions of its charges. It also was ordered to pay to subscribers who own their own instruments a monthly rental of 25 cents and to make no special collections to cover such rental charge. The company also is ordered to establish a depreciation reserve and adopt an acceptable system of accounting.

City Loses Rate War in Memphis

The United States Circuit Court, sitting in Cincinnati, granted a temporary injunction to the Cumberland Telephone & Telegraph Company which will prevent the city of Memphis from putting into effect the new scale of rates adopted by the Board of City Commissioners.

But the court held clearly that the legislature could order an excessive rate lowered, or could delegate to the city the right to make the reduction. The city lost the case on the point that such authority had not been specifically given.

Following closely on the heels of the opinion of the court W. T. Gentry, president of the company, announced reductions in some of the rates, but eventual increases in others, effective January 1, 1913, and plans for the expenditure of $800,000 in improvements of the Memphis service.

Mayor Crump and Charles M. Bryan were not reconciled to the verdict of the court nor to the generosity of Mr. Gentry. The mayor said that he had not finished with his fight for lower rates and better service for the people of Memphis, but owing to the fact that he was not familiar with the court opinion he was not prepared to outline his future course.

Following is the rate schedule:

NET MONTHLY RATES.

	Ordinance rates.	New rates.	Present rates.
Business	$5.50	$6.00	$7.00
Direct residence	2.50	3.00	3.00
Two-party line	2.00	2.50	....
Two-party business	...	5.00	....
Measured calls	...	4.00	....

At present the company offers only straight business and straight residence rates. The above rates are less the discount. Under the new rate, 25 cents will be added to residence rate when there shall be 15,000 phone stations, and 50 cents after 20,000 are secured, an increase of 25 and then 50 cents over the present rate.

The net result would be a present decrease in general telephone charges of $3,900 per month, but when the number of phones reaches 20,000 the increase in residence rates would balance the decrease in business rates.

Blind Qualify as Operators

How to provide employment for the blind is a question that has been given at least one more practical answer. The blind can be trained into competent telephone operators. It was in Baltimore that a blind girl passed the severest test of the work, and now the Maryland School for the Blind has turned out five other well-trained girls.

The possibilities of this occupation are not unknown to Massachusetts institutions. A number of cases are on record of their pupils who have under various conditions done excellent switchboard work, the most conspicuous being that of the young woman who operates the exchange at West Burke, Vt., which includes forty lines of 140 subscribers and an average of twenty toll calls daily. In training certain pupils the local institutions for the blind have had the co-operation of the training school for switchboard operators maintained by the New England Telephone Company.

The blessing that this semi-mechanical employment may be, even to the partly blind, may be guessed from a typical case—that of a young woman whose eyesight and nervous system were both breaking down under the strain of bookeeping work, which she was obliged to perform with the aid of an intense light and powerful lens. The training of the private branch exchange operator was provided for her, and fortunately a position was not long in following. The new employment wrought a magical improvement in her health and an eventual betterment of her defective eyesight.

This employment is open to the blind or partly blind apparently under two limitations; first, that they are serviceable chiefly on the private branch exchange (the present experiment in Baltimore is in the Y. M. C. A.), and, second, when the operator is almost or quite sightless the switchboard must be of the "shutter drop" type, in which the signal is given, not by a light, but by the click of the dropping number. But given these conditions blind operators have, even in the hard commercial sense, "made good." For the blind have faculties denied to those who can constantly check up their acts by their eyesight. The blind have wonderfully sensitive touch and hearing. They have memories marvelously retentive of everything ever acquired. The details which the average person relegates to a card catalogue or to the memorandum pad at the very least the blind instinctively carry in their brains. They become, therefore, peculiarly efficient at the switchboard of the private branch exchange, where the thousand and one details of an office come to a focus.

Here, then, is an occupation in which the blind can be not only serviceable but valuable. The institutions undertake to train pupils so that they shall be capable in this capacity. In places where the private branch exchange also involves clerical and messenger work the problem of adapting it to a blind operator is merely one of a re-division of labor. Leaving wholly out of consideration the commercial establishment, if institutions of a semi-public and quasi-philanthropic character—such as hospitals, schools, asylums, libraries, charitable societies and the like, which may be supposed to take an interest in this sort of thing—would apply themselves to the task of suiting the telephone operating of their establishments to the employment of the blind they would be rewarded with operators of peculiar conscientiousness and efficiency, and the old, old problem of how to find work for those suffering from this infirmity would be solved for very many of them.

Telephones on the Gulf, Florida and Alabama

A new railway system, the Gulf, Florida and Alabama, which is an outgrowth of a railroad originally used by a large timber company and now converted into a standard gauge road, is to be equipped with telephones for dispatching its trains. In furtherance of this plan, an order for the necessary apparatus has been placed with the Western Electric Company.

Fifteen way stations are to be equipped with No. 102-B selector sets which contain the standard Western Electric No. 50 type selector, while the talking apparatus will consist of head receivers and chest transmitters. There are also to be fifteen siding telephones of the No. 1317 magneto type installed along the right-of-way. A portable train set and line pole will be used by train crews.

The train dispatching circuit will be about ninety miles in length, extending from West Pensacola, Florida, to Local, Alabama. The dispatcher will be located at Pensacola.

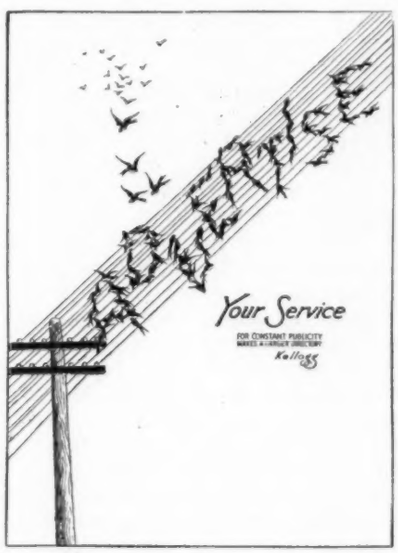
Of Interest to the Trade

By A. L. Haase

"Advertise Your Service"

Real cooperation, that is the idea received upon reading through the latest Kellogg Switchboard & Supply Company bulletin entitled, "Advertise Your Service." While this twenty-four page bulletin is simply and unpretentiously made up, every page contains a valuable suggestion to the telephone man who is interested in a growing exchange.

As the title suggests, the keynote is "Advertise Your Service, for Constant Publicity Makes a Larger Directory."



Beginning with the introductory paragraph illustrating some early Kellogg advertising cuts, this bulletin emphasizes the importance of assistance in advertising and the importance of "news copy."

Local features in advertising cuts to interest the people of a town in their most important institution, the telephone exchange.

There is a page of plates familiar to readers of telephone journal advertising, which can be combined with the local news stories in the home paper.

Then following are a dozen or more original and uniquely illustrated advertising plates.

Covering the more important needs of the telephone from the standpoint of the subscriber, such forceful titles as, "Are You On The Map?" " 'Phones and Opportunities," "Stop! Don't Cross the Street," "Is Your Home an Oasis?" show that these are messages that will be read. Most of them are suitable for every size exchange. There are paragraphs on, "Selling Telephone Service," "The Value of Repetition," "The Need of Your Service," "A Word About Cuts," "The Telephone Directory," "The Local Bradstreet."

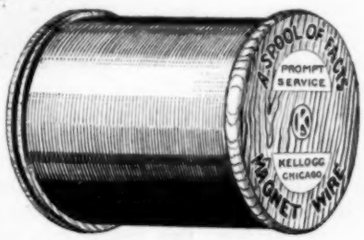
The last four pages show some of the well known Kellogg plates, among them being the attractive farm telephone scene, "Neighborhood News," the cartoon, "Some Modern Pirates," illustrating the "nerve" of the telephone borrowers. Notes on lantern slides and miscellaneous advertising cards and novelties, four of new "Way to Talk" half tones appear on the last page.

This book shows not only the aggressive, up-to-date spirit of the Kellogg Company but its policy of real cooperation with their customers in helpful sales service.

A copy of this book will be sent to those interested. As the edition is limited, it will be wise to send for your copy at once.

Magnet Wire

If you are in any way interested in magnet wire, either silk or enamel insulated, you will profit by mailing a card to the Kellogg Switchboard & Supply Company asking to be put on its magnet wire mailing list, as this firm has just issued a series of novel and forceful advertising matter that is really valuable in the technical information given.



As all buyers know, magnet wire comes in spools and the Kellogg Company has carried out this idea by compiling "Spools of Facts," twelve of them, each one taking up one phase of the magnet wire subject.

These "spools" are printed on heavy stock in three colors to indicate the yellow wooden spool ends, the glossy black of the enamel insulated wire and the green of the silk covered wire. Each "spool" is therefore an exact reproduction, enclosure size, and is cut in the shape of the real article.

On the inside, as stated, is presented a chapter on Magnet Wire Service and quality. Some of these titles, to indicate their nature, are "Spool of Facts on Baking," "On Enameling," "On Prompt Shipments," "On Equipment."

In addition to these "spools" the Kellogg Company is distributing an attractive folder technically describing its magnet wire in an exceedingly interesting manner.

The subject of magnet wire is so new that few of us have any conception of the difficulty in the production of good wire and of the good points of service that do not appear on the surface of the wire on the spool.

Copies of the "spools" series will be sent out monthly.

Binding Posts and Connectors

In every exchange, time and again, information on small telephone parts is wanted and is lacking. The Kellogg Company in its bulletin No. 65, recently from the press, has listed, with new cuts, binding posts and connectors. To quote from the first paragraph of the bulletin:

> Suitable binding posts, connectors or punchings are always in demand by operating telephone companies, and also telephone and annunciator assemblers. This bulletin shows and describes a few of the products of our screw machine and punch press departments and the gauge and material of the connectors listed in this bulletin are those used regularly in turning out our own product. Our manufacturing equipment is complete and of the latest improved design, producing each type of post or connector with wonderful accuracy.

In addition, this bulletin shows two views of the splendid equipment used by this company in the production of its excellent line.

Indiana Wire

A great many people have been customers of the Indiana Steel and Wire Company for years without any conception of either the size of the Muncie plant or the high efficiency of its operations. While we cannot hope, within the limits of this brief article, to convey any adequate impression to those unfamiliar ones, we can at least point out a few interesting features.

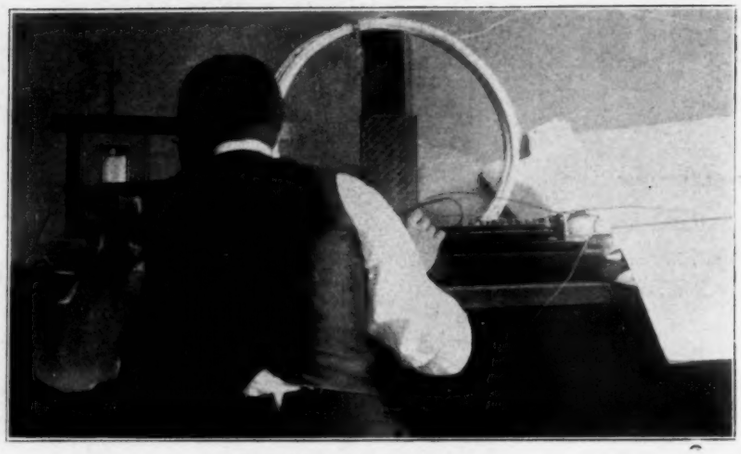


Fig. 1. Measuring Resistance.

Fig. 1 is a view in the testing laboratory of the Muncie plant. It shows an expert measuring the resistance of Indiana wire on a Kelvin bridge, the most delicate and accurate of resistance measurements. All the company's wire product is so tested, except when the customer indicates a desire to make his own tests.

Fig. 2 shows a Riehl machine on which is being tested the strength and elongation of wire in the laboratory. Next to electrical come physical properties, and by this machine the company can determine the use and abuse the wire will stand. The electrical properties can often be obtained by sacrificing the physical properties, but both are almost of equal importance and must be maintained if wire is expected to pass inspection and give satisfactory service.

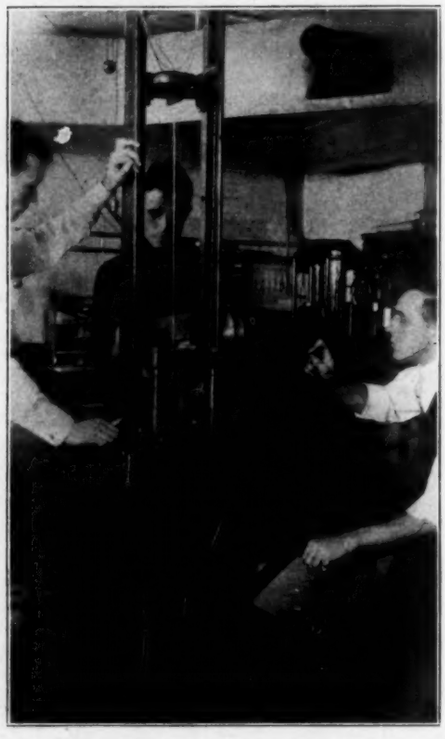


Fig. 2. Strength and Elongation Test.

The torsion test is the most severe test given telephone wire. A piece six inches in length is required to stand fifteen complete twists without breaking. The ends are fastened in a vise-like machine and the twists are registered by a counter.

The company guarantees its wire to stand two or three times the number of twists required. In order to do this the quality and treatment must be absolutely right.

All wire will conduct a current or transmit speech to some extent, and all wire will, in a measure, stand some of the other tests, but where highest degree of efficiency, lowest cost of upkeep and general satisfaction is desired it is best to use the kind of wire which science teaches is best and the kind on which telephones are made to work.

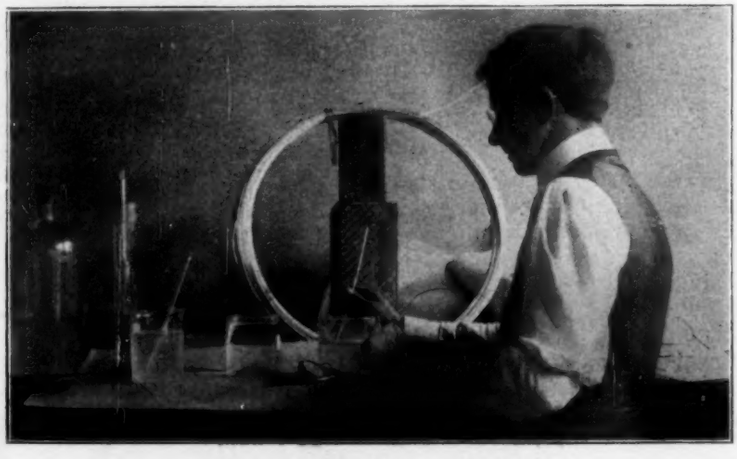


Fig. 3. Chemical Test of Galvanizing.

Fig. 3 represents a laboratory test being made by dissolving five ounces of sulphate of copper—blue stone or blue vitrol—in one pint of water. The temperature of the solution should be maintained between 62 and 68 degrees Fahrenheit at all times during the test.

If in addition to efficiency and service one also wants life, one should exact great care in selecting wire. The formula for testing galvanization is so simple, inexpensive and easy it should be freely used. The wire that stands the best test in acid will also last longest in service.

Good telephone wire must stand four one-minute immersions, with the exception of No. 14, the test of which is three and one-half minutes. Immerse the wire one minute, remove and wipe dry, then repeat until this has been done the required number of times, when if after wiping the wire it shows red the galvanization has been eaten off, but if it continues dark it shows the galvanization to be O. K.

All these tests are scrupulously conducted in the well equipped laboratories of the Indiana Steel and Wire Company, assuring the purchaser of wire a "tried and true" product, which is bound to be satisfactory.

Fig. 4 shows the plant as it actually is, in other words, it is not, like so many "bird's-eye views," a representation of the manufacturers' dream, assisted by the artist's imagination, but a true perspective layout. Small as the picture is, it gives some idea of the magnitude of its subject. Every modern facility for wire making is employed within the walls of these splendid buildings.

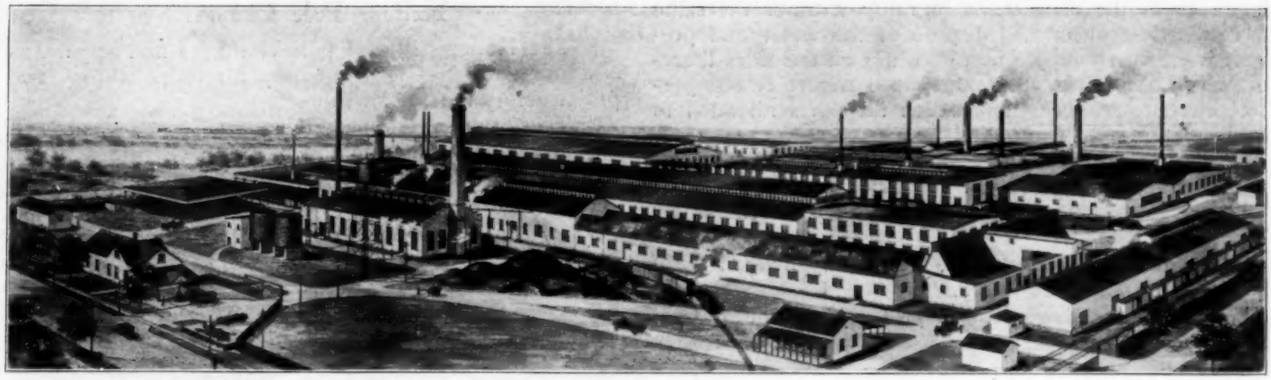


Fig. 4. Bird's-Eye View of the Indiana Steel & Wire Company's Plant at Muncie, Ind.

Use of Motor Trucks Increasing

Few persons have any idea how rapidly gasoline and electric delivery wagons and trucks are coming into use throughout the country. In Massachusetts the registrations increased from 2,189 on September 1, 1911, to 3,560 on the same date in 1912—an increase of 1,371 or 62½ per cent. In Washington, D. C., there are now 500 motor trucks and wagons where a year ago there were 218, and in Los Angeles, California, where there were 70 a year ago, there were nearly 1,300 on November 1, 1912, an increase of more than 1,700 per cent. There has been a 120 per cent increase in Chicago in the last year, with 2,094 trucks registered in September as compared with 800 registered in May, 1911.

There are estimated to be 50,000 in use in America at the present time, and basing prediction upon the increases shown, the number will be nearly doubled during the year 1913. There are indications on every hand that business men are at last convinced of the reliability, superior efficiency and economy of the motor wagon in its many forms and are now converting their horses and wagons into motor equipment as fast as conditions permit. Express companies, contract delivery and transportation companies, storage warehouses, department and dry goods stores, city fire, police and street departments, brewers and coal dealers, are especially active just now in placing large orders for motor trucks. The Adams Express Company is now operating 485 motor wagons in different cities and the American Express uses 352. Altogether, the five leading express companies have 968 in service. Other large fleets are the New York Edison Comapny's 104, Gimbel Bros'. 100, Jacob Ruppert Brewing Co.'s 81, Western Electric Co.'s 63, Texas Oil Co.'s 53, Jas. A. Hearn & Co.'s 73, Peter Doelger's 57, Burns Bros'. 21 ten-ton coal trucks, and many others that might be enumerated.

Manufacture of commercial cars has kept fully abreast of the demand for them so that there is a much larger number of makes in all sizes from 500 pounds up to five tons' capacity to select from than there were even so recently as last winter. There has been a decided increase in the number of new models in the smaller sizes, particularly in the 1,500 pound, one-ton and 3,000 pound capacity machines, in both the gasoline and electric types. There is a disposition on the part of the manufacturer to meet the requirements of the user not only in the capacity of the machine but also in the matter of special body construction to adopt it to any line of trade from millinery to contracting and from undertaking to fire department service.

All of the new models of the best makes of trucks, incorporating such recent improvements as self starters, demountable and automatic dump bodies, left side steer and center control, differential locks, worm drive, shaft drive in electric vehicles, sealed speed governors, spring-supported power plants, demountable tires, and so on, will be brought together for easy inspection and comparison at the Chicago Automobile Show, the second week of which, from February 10 to 15, is reserved for the exhibition of commercial cars and accessories exclusively. This offers the only chance of the year to see seventy-five or more different makes in one city at the same time, and consequently the only opportunity to get posted on all of the improvements of the year and the wide range that is offered for selection in sizes, construction and prices.

Priority Decision on Strain Insulators

Louis Steinberger, president of the Electrose Manufacturing Company, Brooklyn, has been awarded a decision for priority in his interference case with Hewlett, covering disk strain insulators.

The claims contested follow:

1. A disk strain insulator, comprising suspension members, a mass of insulating material partially enveloping the same, said mass being provided centrally with a disk integral herewith and lying substantially in the general equatorial plane of said mass, and further provided with flanges extending in opposite directions from said equatorial plane.

2. A disk strain insulator, comprising suspension members, a mass of insulating material partially enveloping the same and having a disk portion, said disk portion being provided with annular collars extending in opposite directions and in the general direction of said suspension members.

3. A disk strain insulator, comprising strain members, a body of insulating material partially enveloping the same and having a comparatively large disc, said disc being provided with collars integral therewith and extending in opposite directions.

The invention relates to disk strain-insulators for electric conductors designed to mechanically secure and at the same time electrically insulate two connecting parts. It was desired to construct these insulators so as to prevent creepage of current over the surface thereof, not only in dry weather, but in wet weather as well, and this was accomplished by the construction claimed.

In dry weather the irregularities in the surface of the sides of the disk provide against surface leakage by making additional surface without increasing the

diameter of the disk, while in rainy weather the same irregularities collect and dispose of the water and prevent the formation of a film of water on the sides thereof, which film if present would cause a more or less perfect electrical connection between the parts intended to be insulated from each other.

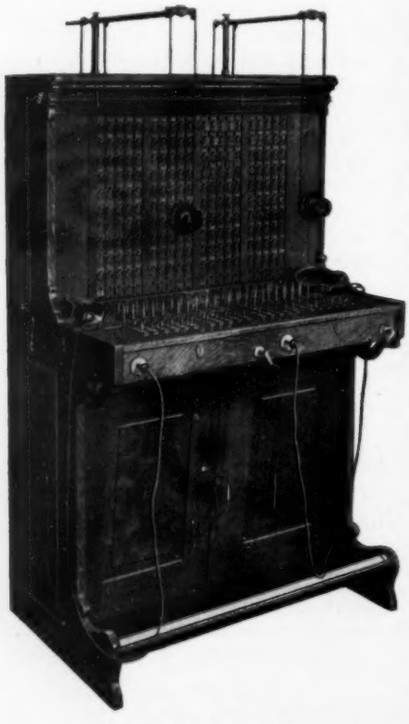
The record shows that Steinberger filed his application, Serial No. 411,812, on January 20, 1908, and that this application matured into a patent on November 17, 1908, No. 904,370.

Hewlett, the senior party, filed his application April 20, 1907, Serial No. 369,245.

Steinberger, however, was proven to be the original inventor.

Switchboard Replaced in 48 Hours

Only the exchange man who has experienced the misfortune of having his switchboard and equipment destroyed by fire can realize how long a time forty-eight hours can seem in such an emergency. One's state of mind vastly affects the apparent length of the minutes. Five minutes before work begins and five minutes before quitting time are two wonderfully different propositions. Two days can seem almost a week to the man who is furnishing the most important service to the people in any city, when he surveys the smoldering ruins of what was once his at least serviceable exchange.



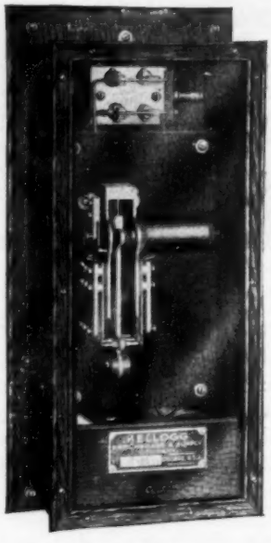
Kellogg Magneto Board.

The files of the Kellogg Switchboard and Supply Company show repeated testimonials to the efficient manner in which it has shortened the days to these unfortunate operators by getting them, in the most expedient manner, brand new equipment.

A case of this kind happened last week, when an enterprising telephone company in Michigan unfortunately lost its switchboard by fire. This was a special 200-line magneto board equipped to nearly half its capacity, and the rush order called for complete cable and rack equipment. Exactly forty-eight hours after the order was received, this new equipment was on its way to the Michigan city. Kellogg sales service certainly proves its reliability in emergency requests for types of installations.

Kellogg Pole Changer

The Kellogg line of pole changers and apparatus is admittedly excellent not only for its reliability and practicability but for its value with every type of equipment. Equally efficient is the line of circulars and instruction folders that go out with this apparatus. For instance, take the instructions for installing No. 9-A pole changer. In a great deal of electrical apparatus the buyer's information is limited by a set of blue prints and blurred letter copies. The No. 9-A instruction folder is printed on high grade paper, large clear type, with two excellent halftone illustrations of open and closed views of the apparatus; the open view listing all the various parts, while the type matter describes in a comprehensive way how the pole changer should be mounted and operated.



Kellogg Pole Changer.

If you are interested in this subject, write the company, stating the type of your equipment and its needs and the appropriate bulletin and folders will be sent promptly, with full information.

Hawthorne—A Bird-Man's Eye View

The bird's-eye view of a manufacturing plant drawn from the imagination of an architect's set of plans has had its day. The bird-man's eye view, showing things as they are and not as the manufacturer would like to have them, is coming into its own, thanks to the daring photographers who think nothing of going up a thousand feet or more in an aeroplane for the purpose of taking snap-shots of the earth below.

The *Western Electric News,* which is published monthly for the employees of the Western Electric Company, has included in its December issue a supplement showing a general view of the Hawthorne works made from an actual aerial photograph. The photograph was taken by Photographer Wagner of the Chicago *Tribune,* who went up in an aeroplane with Aviator Lillie for that purpose.

A Real Bird's-Eye View.

Previous composite pictures of the Hawthorne works have not been satisfactory owing to the fact that so many obstacles to the obtaining of a true perspective were presented by the immensity of the complex of buildings. About a year ago, bird's-eye view specialists were commissioned to go to Hawthorne and make a new attempt. The results were not satisfactory. The plan of making separate photographs of each building and producing from these a composite view was then tried with no better success. Then the idea of obtaining an aeroplane picture was suggested by the proximity of the grounds of the Chicago Aero Club at Cicero—where some of the world's greatest flights have been made.

The immensity of the Hawthorne plant also presented a great many obstacles to the taking of a successful aeroplane picture. It was necessary to rise to quite a height in order to get everything in; while the best view point had to be determined with great care. The resulting picture shows how well the photographer succeeded.

Five flights were necessary to secure an acceptable picture. The aviator and the photographer rose to a height of 2,500 feet and the aeroplane was permitted to glide down to 1,000 feet at a speed of 45 miles an hour. Between heights of 1,500 and 1,000 feet the picture was taken. Experts who have seen the result declare it to be one of the most remarkable photographs ever taken.

Stromberg-Carlson Transfers Branch Office

At the close of the year the Stromberg-Carlson Telephone Manufacturing Company transferred its Kansas City sales office to the Chicago branch, where it has much larger quarters, a more complete line of telephones and telephone apparatus, also a more complete and efficient sales and engineering organization. This change enables it to give southwest customers better service than was furnished through the Kansas City branch. It will continue to carry at Kansas City a selected stock of standard telephones, boxed and ready for immediate shipment to customers in the Kansas City territory. All communications will hereafter be addressed to the company at Number 708-710 West Jackson boulevard, Chicago, Illinois, instead of Kansas City. Although shipments will be made from Kansas City; instructions will be sent to Chicago, where all orders will be handled the same day as received. Traveling representatives in the Kansas City territory will call on the trade regularly as before and offer every assistance which the excellent service provides. At the conclusion of the 1912 business year, which has brought a larger volume of trade than the preceding one, the company wishes to thank its patrons for the business given it and to ask for the same opportunity in future as has been enjoyed in the past of meeting requirements, in the same satisfactory manner.

Telephones Merged at St. Joseph, Mo.

An ordinance authorizing the merger of the Missouri and Kansas (Bell) and Home Telephone Companies was passed by the St. Joseph, Mo., city council at its last meeting. The conditions upon which the council gave its permission for the consolidation are that the surviving telephone company yield to the city a franchise tax of two per cent of its annual gross earnings, that the present rates of the Bell company be the maximum rates until July 1, 1918; that the merger be effected within six months from January 1; also that contracts with rural exchanges be fulfilled where possible.

The vote in favor of the merger was unanimous and following the passage of the ordinance Councilman C. D. Radford made a brief talk in which he praised the members of the public utilities commission, Mayor Pfeiffer and W. B. Norris, city counselor, on the fairness both to the city and to the telephone company, of the ordinance authorizing the merger.

The Bell company will, it is understood, take over the properties of the Home company immediately and operate the two exchanges separately until the consolidation is perfected.

Thompson-Levering in Bigger Quarters

The Thompson-Levering company has taken new factory space over four times as big as the building previously occupied.

This move was demanded by the constantly increasing orders for "Peerless" electrical testing instruments. Persistent publicity on a product which will stand up to every claim made for it has made this line of testing apparatus one of the best known brands now being used in the telephone, telegraph and electrical fields.

A great many independent telephone companies rely on the engineering ability and technical efficiency of these two young men for their "instruments of quality," while such critical purchasers as the American Telephone and Telegraph company engineering departments, the Postal Telegraph company and the Western Electric company are regular patrons of the T-L brands of apparatus. The constant reordering of T.-L products by the associated Bell companies is a testimonial that the young firm is exceedingly proud of.

Book Review

THE PRACTICAL ELECTRICIAN'S POCKET BOOK AND DIARY, by H. T. Crewe, is a handy reference work that should prove of interest to every one having to do with electrical installations of any kind.

The little work is put up in pocket form so that it can be readily carried for reference no matter where the reader may be employed.

The usual familiar tables and data sheets make up a part of what should prove interesting to the trade.

S. Rentell & company, London, W. C., England. Cloth, $5.00.

A New Wire-Skinning Plier

In the Goodrich wire-skinning plier, Mathias Klein and Sons, Chicago, have a device which is calculated to do away with the slow and tedious jack-knife method of peeling insulation off from wires. One clip of the jaws of this new tool and the insulation is off.

At present the tool is made for No. 14 wire, that being the size in most general use. As it cuts, splits and removes just the amount of insulation wanted, and then scrapes the wire clean, it does in one-tenth the time a cleaner job than the old common knife and without nicking wires or fingers.

The Supreme Court has decided against the city and county of San Francisco in the suit brought to set aside the sale of the Home Telephone Company to the Pacific Telephone and Telegraph Company. The city sued to set the sale aside on the ground that it was voided by a provision in the Home Company's franchise forbidding it to sell or transfer its property, right or privileges under the franchise. Judge John F. Ellison holds that this provision is null and upholds the defendant corporation's demurrer to the city's complaint.

In addition to sending out to the trade a New Year's edition of "Telephone Facts" containing some interesting sales items and publicity stunts, with readable telephone articles by different members of the sales and other departments, the Kellogg company has been sending to its customers and friends a beautifully engraved card, 6 by 3½ inches, the upper left-hand corner of which is a fine reproduction of the Kellogg desk telephone, surrounded by green holly sprays, sprinkled with red berries.

The Metallic Lightning Arrester company has moved its offices to Lewiston, Minn., which will greatly improve its facilities for getting out orders. The company announces that indications point to a very heavy sale on these arresters during the coming season. They are being put on the market through all the leading electrical jobbers. The arrester seems to be attracting a good deal of attention on account of its efficiency as a phantom circuit protector.

The twenty-sixth annual report of the Interstate Commerce Commission, submitted to Congress on December 16, includes a recommendation that the authority of the commission over telegraph and telephone corporations be more explicitly defined.

William J. Murdock Company, Chelsea, Mass., has just issued a most interesting booklet on telephone receivers, describing especially the Murdock "solid" receiver.

An interesting folder has just issued from the offices of the Standard Underground Cable Company, Pittsburgh, about Standard rubber insulated wire.

Among a host of calendars received, that of the "1900" dry battery, Nungesser Carbon and Battery Company, is especially noticeable for its "little giant" feature —a big calendar in a small space.

"I'm the guy that set a new age in anchorage," says W. N. Matthews & Brother, St. Louis, in a pictorial folder showing the troubles of the construction crew solved by the use of screw anchors.

Emil A. Nyquist and H. Larson will open an up-to-date electrical supply and jobbing house at 14 and 16 No. Franklin street, Chicago, about January 20.

Brevities of the Business

PERSONAL NOTES.

James Clarence Kenny died December 23, 1912, at his home at 7200 Yale avenue, Chicago. He was born in Peoria, Ill., June 3, 1856. When he was but four years old he lost both his parents, and at the age of 14 went to work. Prior to 1882 he was with the Western Union Telegraph Company, and in that year he became purchasing agent for the Central Union Telephone Company. In 1894 he was made joint purchasing agent for the Central Union and Chicago Telephone Companies. In 1903 he became assistant general purchasing agent for the Western Electric Company at Chicago, also being western manager of that company's pole department. During 1910 and 1911 he was purchasing agent for the Subway Construction Company, Chicago. In 1911 he was again appointed western manager of the Western Electric Company's pole department, and held that position at the time of his death. Mr. Kenny was a director of the Turbo Engineering Company and a member and director of the Hamilton Club, Chicago. He is survived by his wife (he married Katherine May Mead, November 18, 1878), a brother Thomas, and four sons, James, Albert, Paul and Thomas. Since leaving Peoria as a boy he had always lived in Chicago. His was one of the most familiar figures in the telephone trade, and will be sorely missed.

P. S. Barber, who since July has been manager of the telephone exchange at Coalinga, Cal., has been transferred to his old position with the same company in the Oakland office. E. R. Gardner, who has been commercial manager of the Modesto Exchange for the past two years, has been transferred to Coalinga and is now in charge of the office.

Fred B. McKinnon, of Topeka, Kas., secretary-treasurer of the association, is connected with the Tonganoxie Telephone Company.

Walter Brown has been made secretary and treasurer of the New York Telephone Company, to fill the vacancy made by the promotion of Mr. Huntington, and J. S. Wiley has resigned as assistant comptroller of the American Telephone and Telegraph Company, and succeeds Mr. Brown as general auditor of the New York Telephone Company, the Bell Telephone Co., of Pennsylvania, and associated companies, and the C. & P. Telephone Company.

George H. P. Barnum, formerly manager of the exchange of the Home Telephone Company at Albany, Oregon, is now special agent of the commercial superintendent, with headquarters at Vancouver.

Charles Bourseul, who has been credited with first suggesting the possibility of the electrical transmission of speech, died in Paris, France, on November 25, at the age of eighty-three. His prophecy was regarded at the time as so novel and incomprehensible that Du Moncel, by whom the account was first published, pronounced it a wholly fantastic idea. Mr. Bourseul did not propose or construct any mechanism which would successfully transmit speech or complex sounds by electrical means. For many years he had been receiving pension from the post office department.

F. E. Carlville, of South Bend, Ind., has assumed the management of the Independent Telephone Company at Kankakee, Ill. Mr. Carlville is a young man, but has been in the telephone business for eight years and left the position of assistant manager of the South Bend Telephone Company to go to Kankakee.

R. R. Patton has resigned his position as manager of the Cumberland Telephone Company in Maryville, Tenn., to accept another position. Leonard Babb, his successor, has been with the company for a number of years in the mechanical department.

Ford Huntington has been elected to fill the new office of vice-president which has been created in the New York Telephone Company, the Bell Telephone Company, of Pennsylvania, and associated companies, and the C. & P. Telephone Company.

J. L. Swayze has been appointed attorney of the New York Telephone Company, the Bell Telephone Company, of Pennsylvania, and associated companies, and the Chesapeake & Potomac Telephone Company.

Albert Elias, for several years superintendent of the Bell Telephone Company at Syracuse, and formerly an official at the

local offices of the company, sailed for Havana in early December. On his return from Cuba, the first of the year, Mr. Elias will become general superintendent for the Southern Bell Telephone and Telegraph Company, with headquarters at Dallas, Tex.

F. B. Milligan has resigned as chief clerk of the plant department to become credit man for the Northern Electric Company.

F. M. Boardman, manager of the Storey County Telephone Company of Nevada, Iowa, was a recent caller at the office of TELEPHONE ENGINEER.

M. J. Stimson of the Southwestern Telegraph and Telephone Company will be succeeded in Little Rock, Ark., by W. R. James, who comes from St. Louis. Mr. James will be division commercial superintendent for the state of Arkansas. Mr. Stimson will have charge of the company's offices in western Texas and left Little Rock for Texas on December 23, after a stay of about fifteen months.

Harvey C. Garber, for many years connected with the Central Union Telephone Company, at Columbus, Ohio, has been elected vice-president and director of the Ralston Steel Car Company, and will represent the company in New York.

Mr. Garber was assistant to the president of the Central Union Telephone Company for seven years and later had charge of a large amount of the business of that company over a wide territory. Prior to that he was connected with the Pennsylvania Railroad Company. He served two terms in Congress and previously was a member of the Ohio house of representatives.

William H. Turner of Adams, has been chosen manager of the Lincoln Telephone and Telegraph Company at Tecumseh to succeed E. E. Michael, who recently resigned to go into business in Brainard, Minn.

George C. Hall has been promoted to the office of division commercial superintendent of the Southern Bell Telephone Company at Louisville, Ky. His recent office was division superintendent.

Charles W. Caldwell, manager of the Nashville office of the Cumberland Telephone and Telegraph Company, has been appointed commercial manager for the Nashville district.

W. G. Rauch, formerly special agent of the Southern Bell Company, goes to Louisville from Atlanta as Louisville division plant superintendent.

Kendrick C. Hardcastle, Nashville, will be division traffic superintendent of the Southern Bell and Cumberland Telephone Companies, and J. W. Crews, Birmingham, will be division plant superintendent.

L. E. Winget, of Atlanta, who has been special agent in the engineering department of the Southern Bell Company goes to Louisville as division traffic superintendent.

J. Epps Brown has been appointed general manager of the Cumberland Telephone and Telegraph Company, to succeed Leland Hume. The officers of the two companies, the Cumberland and the Southern Bell, are the same. The organization consists of a president, three vice-presidents, secretary and treasurer. Mr. Brown, for many years general manager of the Southern Bell, will be vice-president and general manager of both companies, with headquarters in Atlanta, while Mr. Hume will be vice-president, with headquarters in Nashville.

F. C. Manning, vice-president of the Sumter Telephone Manufacturing Company at Columbia, S. C., has been on an extended trip in the north and west on business connected with the expansion of the business in manufacturing magnetos.

Frank Keenan, manager of the branch of the telephone company at Bismarck, N. D., has resigned, his resignation taking effect January 1.

Union Noble Bethell, president of the New York Telephone Company, will be appointed to the Montclair Board of Education to succeed Ellis L. Aldrich, whose term expires on January 31. Several months ago Mr. Bethell created a scholarship fund of $10,000 for graduates of the Montclair High School in memory of his daughter.

M. F. Hill was elected president and manager and E. Beeman vice-president of the Prophetstown (Illinois) Mutual Telephone Company. H. G. Hotchkiss was re-elected secretary and O. P. Petty, treasurer.

Leland Hume, formerly general manager of the Cumberland Telephone and Telegraph Company at Nashville, Tennessee, has been elected vice-president and general manager, and M. O. Jackson of Atlanta, assistant general manager. It is understood that Mr. Hume will also be elected vice-president of the Southern Bell Company at the next meeting of the directors.

F. H. Bethell, of New York, president of the Bell Telephone Company and its associated lines, together with a number of other high officials, made a recent visit to Harrisburg, Pa., on company business. It was announced that Harrisburg would be in for its proportionate share of the $8,000,000 appropriation in 1913 for improvements. In the party were L. H. Kinnard, second vice-president and general manager; W. R. Driver, Jr., general superintendent of traffic, and J. H. Crosman, Jr., general commercial superintendent. While at Harrisburg they were accompanied by G. S. Reinoehl, the newly-appointed division manager; B. Stryker, plant superintendent, and S. E. Gill, traffic superintendent, the division heads of Harrisburg, and S. S. Eberts, district manager.

H. A. Shepard, formerly purchasing agent for the Ericsson Manufacturing Company at Buffalo, N. Y., is now general sales agent for the Tiffany Electric Manufacturing Company at 143 Michigan street, Chicago.

E. L. May, who has been in charge of the Tiskilwa telephone exchange as manager since the independent company was organized there in 1902, has left for Manistique, Mich., where he expects to engage in the telephone business. Mr. May owned and operated one of the first local lines in Bureau county as early as 1899, and when the Bureau county independent entered the field his exchange was taken over and he retained as manager.

O. M. Angvick, who has been manager of the Washburn, Minn., exchange of the Bell Telephone Company for several months, has resigned to be associated with his uncle, Sam Angvick, at Ashland. Mr. Angvick will be succeeded by E. E. Gibbons of Eau Claire.

T. Gray Gentry, who has long been connected with the supply department of the American Telephone and Telegraph Company at Chattanooga, Tenn., and was recently placed in charge of a large district in that department, has become manager of the Chattanooga telephone exchange and district manager for the company.

V. W. Peck, of Cardington, was elected president of the Galion Telephone Company, succeeding A. A. Whitney. J. C. Williamson was made a director succeeding Mark Cook, who resigned on account of ill health and has gone to Florida. Solomon Wolf, of Bellville was elected vice-president.

Fred Latta, for many years district manager of the Cumberland Telephone and Telegraph Company at Columbia, Tenn., has been given general management of the recently merged telephone company with that of the Western Union Telegraph Company.

President, E. S. Stewart, Henry, Ill.; vice-president, A. G. Hawley, Clinton, Ia.; secretary, C. B. Cheadle, Joliet, Ill.; treasurer, C. A. Camp, Henry, Ill., was the result of the recent election of officers held by the Peoples' Telephone Company at Chillicothe, Ill.

D. C. Cox of Syracuse, N. Y., has been appointed to fill the vacancy on the board of directors of the Black River Telephone Company at Lowville, N. Y., the death of Payson Thompson of Henderson, causing the vacancy.

Harry D. McBride, for five years traffic manager for the Southwestern Telegraph and Telephone Company, at Dallas, Texas, has been sent by the company to St. Louis, Mo. Three farewell dinners were given by various groups of business and professional men to Mr. McBride who, during his stay in Texas, endeared himself to all who knew him. Everyone expressed the hope that he would come back to Dallas to live and to work, though wishing him success in St. Louis. Mr. McBride declared he would rather have the affection these men had assured him they hold for him "than to be the richest man that ever took the 'Katy Limited.'"

W. S. Peirsol, formerly secretary and assistant treasurer, has been made secretary and treasurer of the Bell Telephone Company of Pennsylvania and associated companies and the Chesapeake & Potomac Telephone Company.

H. J. Johnston, for the last three years local manager for the Michigan State Telephone Company at Charlotte, has been transferred to Traverse City, where he will have the supervision of the company's business in five counties. Manager Lampman of the Holland exchange will take charge of the local business.

George G. Brown and Frank Rhoda were elected directors to succeed J. F. Johnson and John C. Heins, at the annual meeting of the Chenoa, Ill., Telephone Company.

William Sanders succeeds Mr. Collis Manning as manager of the telephone exchange at Willis, Texas.

H. J. Pettingill, formerly superintendent of the Postal Telegraph Company in Boston, will be the head of the Southwestern Telegraph & Telephone Company in St. Louis, Mo., capitalized at $40,000,000, which is a reorganization of the Bell Telephone

Company of Missouri, the Southwestern Telephone Company and the Missouri & Kansas Telephone Company. J. P. Crowley will be secretary, and Theodore N. Vail, Charles H. Wilson, U. N. Bethel and Royal Ferris, directors.

J. R. Porter, exchange manager of the Cumberland Telephone Company in Chattanooga for several years, has been transferred to Knoxville, where he will become division superintendant for the Cumberland Telephone Company for eastern Tennessee.

W. J. Williams, manager of the Cumberland Telephone Exchange at Culleoka, Tenn., was seriously injured by a fall from a tree. He was at work for the company near Campbell Station when the accident happened. He suffered some contusions on the head, a wrenched shoulder and an injury to the chest. He will recover.

J. C. Belshe, for several years president of the Republican Valley Telephone Company of Franklin, Neb., has left on an extended trip, to be gone over a year.

William J. Hare of Jamestown, N. Y., has purchased from N. W. Landers of Sinclairville a majority of the stock of the Central Chautauqua Telephone Company. When the sale was consumated, the company was reorganized by the election of Mr. Hare, president, and Mrs. Norma L. Hare, secretary and treasurer. Mr. Hare has been connected with the New York Telephone Company for some time. With Mrs. Hare he will move to Sinclairville, taking with him the best wishes of many friends for success in his new venture.

"Genial Jack" Clifford has been placed in charge of the Bell telephone exchange at Manistee, Mich., and E. J. Holihan, former manager there, has been given a similar position in Petoskey. Many farewell functions were given in honor of Mr. and Mrs. Clifford, who had been residents of Petoskey twelve years.

R. W. Daggett, Jr., has resigned as local maanger of the Wisconsin Telephone Company at Madison, and James P. Brahany has been appointed as his successor. Mr. Daggett has for the past ten years been constantly in the employ of the company, starting in 1902 as clerk and later serving as cashier, and then manager at Madison. For the past three years, Mr. Brahany has been connected with the district organization of the company as district commercial agent.

W. K. Boardman, division superintendent of the Cumberland Telephone & Telegraph Company at Knoxville, has received a merited promotion, becoming division commercial superintendent, with headquarters at Nashville, on January 1. Mr. Boardman will have supervision over greatly increased territory embracing middle and west Tennessee, middle and eastern Kentucky and northern Alabama.

Ford Huntington, former treasurer of the Bell Telephone Company of Pennsylvania, has been elected vice-president of that company in charge of all financial and accounting matters.

W. A. McLaughlin, of Llyswen, Pa., formerly connected with the Bell Telephone Company as superintendent of construction, has been appointed general manager and commercial agent of the United Telephone Company in Altoona. Since leaving the service of the Bell company Mr. McLaughlin has been employed by the Pennsylvania Railroad Company on special telephone installation work. He will have complete charge of the United company's operations in this district.

Frank Pierce Ross, former manager of the old Columbus Telephone Company, now the Central Union Telephone Company, and for many years assistant manager of the Western Union Telegraph Company in Columbus under his brother, Charles W. Ross, as district superintendent, died at Grant Hospital, Columbus, O., of acute nephritis and heart trouble. Mr. Ross was one of the group of six who founded the Columbus Telephone Company, the first in Columbus, and which afterward became the nucleus of the present Central Union Telephone Company.

Stephen Kennedy, who has been manager of the Rock River Telephone Company since its organization, was manager of the Ogle County Telephone Company for several years, has resigned his position to take charge, January first, of the J. P. Griffin & Co.'s business in Rochelle, Ill. Griffin & Co. are commission merchants at 61 Board of Trade, Chicago.

NEW TELEPHONE COMPANIES.

AUBURN, IND.—Plans have been practically completed for a $50,000 mutual telephone company in Dekalb county. The committee selected at a mass meeting, held in this city recently, have investigated the proposition and agreed to launch the project at once. The name of the association is The Dekalb Mutual Telephone Company, and its object is to establish and operate telephone exchanges in this and adjacent counties in Indiana. The capital stock is $50,000.

AUGUSTA, N. Y.—Sanitary Waterproof Telephone Company to manufacture and deal in telephone instruments; capital, $100,000. President and treasurer, E. M. Hussey, Augusta.

BRADYVILLE, TENN.—A new telephone company has been organized at Bradyville, in the southern end of the county, and is now in operation.

CLARKSVILLE, TEXAS.—Clarksville Telephone Company of Clarksville, Red River County; capital stock, $25,000. Incorporators, W. M. Bloxham, A. C. Stuart, R. B. Harrison, J. F. Rochelle, all of Texarkana, Tex.

DAWSON, GA.—Articles of incorporation have been granted to the Co-Operative Telephone & Telegraph Company with $10,000 capital stock. The incorporators are J. M. Bell, C. D. Cocke, J. E. Morris, J. D. Bell, and R. R. Martin, all of this city. The line will run through Dawson, Cuthbert, Fort Gaines, Blakely and other towns.

ELLIOTTSTOWN, ILL.—Union Telephone Company of Elliottstown, Elliottstown; $5,000; to operate a telephone system; F. M. Haynes, John W. Dobbins, W. H. Endebrook, J. S. Sipes, William Poe.

GEORGETOWN, DEL.—A representative of the Diamond State Telephone Company has solicited subscribers for a line which is to run through Overbrook, a little village near Lewes. It is said enough subscribers have been obtained to insure the installation of the line, and work on the same is expected to be started at once.

HARRISBURG, PA.—The Renovo Realty Company, with a capital of $10,000, was chartered and a charter issued to the Roulette Telephone Company, to do business in Potter and McKean counties, with a capital of $10,000.

KONAWA, OKLA.—The East Fairview Telephone Company. Incorporators, G. W. Hager, R. W. Mann and Ed. Greer.

LAKE COMA, PA.—The Progressive Telephone Company, of northern Wayne county, capital $5,000, has been formed to provide telephonic service for the territory in and around Lake Como, which heretofore has been greatly handicapped through lack of efficient telephonic service. The system will connect with the Bell company at Pleasant Mount. The officers of the company are: President, William J. Healey, Como; treasurer, Fred. A. Tiffany, Poyntelle; secretary, George Gilchrist, Lakewood; directors, the above, and Edward Mills, Preston; Patrick and John Gleason, Como; George Brain, Como; James McGraw, Como; Peter Madigan, Como; Henry Martin, Lakewood; John Yeager, Poyntelle. James J. O'Malley, of this city, is counsel.

MANVEL, TEXAS.—Suburban Gardens Telephone Company of Manvel; capital, $10,000. Incorporators, T. E. Scott, W. B. Scott of Manvel; W. R. Allison of Houston.

OLNEY, ILL.—The Commercial Telephone & Telegraph Company has been incorporated with a capital stock of $500,000 to build telephone and telegraph systems. The incorporators are E. G. Gregg, H. H. Kile and H. H. Knipe.

RIVERDALE, CAL.—The Riverdale & Lanare Telephone Company has been incorporated with a capital stock of $700 for the purpose of maintaining a telephone line between Riverdale and Lanare, a distance of four miles. The directors are Alan Milnes and A. J. VanCleef of Riverdale, and L. A. Nares of Fresno.

ROULETTE, PA.—The Roulette Telephone Company has been incorporated with a capital stock of $5,000.

SAN JOSE, CAL.—Angered at an order of the Pacific Telephone and Telegraph Company establishing Los Altos, two miles away, as a long distance station and charging for switches, the Grange of Mountain View is planning to organize a farmers' line to compete with the Pacific lines. Mountain View's switching privileges have always been limited to a short distance in the surrounding country, while Sunnyvale, its neighbor, has free local service as far as San Jose. Los Altos is to have a switchboard and will be a long distance toll station. The Grange has sent an appeal from the order of the company stating these facts to the State Railroad Commission and will await an answer before going ahead with plans to form an independent company.

SCHENECTADY, N. Y.—A certificate of incorporation has been filed in the county clerk's office incorporating the Maraiville and South Schenectady Telephone Company. The new concern has a capitalization of $500 which is composed of fifty shares at $10 par value per share. The company will carry on the telephone business Mariaville, Duanesburgh, Rotterdam, South Schenectady and Princetown and will construct its lines over the highways and fields of these places. The certificate of incorporation states that the governing body of the company shall consist of seven directors. These officials for the first year

are as follows: Robert C. Cullings of Pattersonville; C. A. Cullings, Mary B. Walpole and D. N. Peek, all of Mariaville; Dilnet Gregg, Robert H. Bradshaw and George L. Peek of Rynex Corners.

ST. LOUIS, MO.—Organization of the Southwestern Telegraph and Telephone Company, with a capital stock of $40,000,000 to take over the properties of the Bell Telephone Company of Missouri, the Southwestern Telephone Company and the Missouri and Kansas Telephone Company, was announced here by H. J. Pettingill, president of the Missouri Bell Company. Headquarters of the new company will be in St. Louis. The new capital stock is $10,000,000 in excess of the capital of the combined corporations, but President Pettingill said no new stock would be issued except to retire present obligations or to provide for improvements as they are decided on.

SPRINGFIELD, ILL.—The Intertownship Telephone Company, of Shabbona, has been granted articles of incorporation with a capital stock of $5,000 to operate a telephone system. C. H. Wilkinson, E. J. Brewer and Charles H. Schermerhorn are the incorporators.

WINGATE, N. C.—The Wingate Telephone Company is capitalized to do business in Wingate, beginning with $3,000 paid up capital. J. W. Bivens, J. Rufus Griffith and Janie May Bivens are the incorporators.

WILLARD, OKLA.—Pioneer Telephone Company of Willard; capital, $5,000. Incorporators, Guy D. Bulen, Yelton; O. Nossaman and George W. Thompson, Willard.

WORDEN, MONT.—The Farmers' Telephone Company of Worden has filed articles of incorporation with the secretary of state with a capital of $10,000. This company will build its telephone system entirely in the rural districts.

RATES.

ALBANY, N. Y.—The Public Service Commission has adopted a set of regulations, effective on January 1, prescribing the form and governing the filing and publication of rate schedules of telephone corporations in this state. Among the new rules is one requiring the companies to keep their rates open to public inspection.

ALMA, N. Y.—There is considerable agitation all over Gratiot county over the recent raise in rates of the two competing telephone companies, the Bell and Union systems.

CASTILE, N. Y.—The Wyoming County Telephone Company sent out notices to its subscribers that, commencing on January 1, rentals on residence telephones would be advanced 25 cents and business telephones 50 cents, which make them $1.50 and $2 per month. There are 525 telephones on the system, covering the villages of Castile, Silver Springs, Gainesville, Pike, Lamont and Hardys. It claims the present rentals are not sufficient to meet the expenses.

FRANKFORT, KY.—The merger of the Cumberland Telephone Company in Lexington with the Fayette Telephone Company, of that city and Fayette county, was followed by an order providing that the rate per month per telephone in the future must be the lowest rate of either company, and that there shall be no increase in the rates in the future.

FREDERICK, MD.—The Frederick Board of Trade will carry to the Public Service Commission the question of telephone rates in Frederick county. It is contended that the rates charged by the Chesapeake and Potomac Telephone Company in Frederick county are not uniform for the class of service given, according to some complaints made to the members of the Board of Trade. Chairman Laird, of the commission, has informed the Frederick Board of Trade that it may bring its charges before the commission and that a hearing will be given in the matter. The Cambridge Board of Trade, he informed the local association, has such a case before the commission.

KEOKUK, IA.—The Iowa Telephone Company and the Mississippi Valley Telephone Company at Keokuk have consolidated and have raised the rates.

LINCOLN, NEB.—An investigating committee of the League of Nebraska Municipalities will probe telephone conditions, including rates, in this state, and will report back to the organization at a January meeting. This was determined at the closing session of the November meeting.

MEMPHIS, TENN.—An in-coming service rate for business houses only is to be instituted by the Cumberland Telephone & Telegraph Company, according to instructions by President Gentry. The service will be furnished at $3.50 per month.

NASHVILLE, TENN.—The Cumberland Telephone Company has announced a reduction in telephone rates in Nashville, the new rates going into effect January 1. The reduction, as announced, is from $7.50 a month to $6 a month for straight business lines, and with other slight reductions for other service. The new rate will put Nashville subscribers on the same terms as Memphis, where an ordinance to require the company to reduce its rates was recently passed by the general council.

PERRY, IA.—The business men of Perry are divided as to the Hawkeye Telephone Company's proposed change in rates due to the change in the telephone plant here. Much opposition is felt because of the desire of the company to raise the rates from $5 to $3 per year on each individual telephone in case the present magneto system is discarded and a common battery board installed in the central office.

PORT CLINTON, O.—The city council has been trying to locate the franchise granted the new Ottawa Telephone Company in 1898. This franchise has either been lost or was never recorded. A copy, as published in one of the newspapers of this city, shows the franchise does not allow the company to raise its rates, which the company did about a year ago.

ST. JOHNSVILLE, N. Y.—It is announced that after January 1, 1913, the monthly rates on residence telephones will be, for single telephones, $1.50; for four party telephones, $1.25. Many subscribers feeling that this raise is uncalled for have stated that they would not renew their contracts, but this may not affect the company, which now has a monopoly in this section.

TOLEDO, O.—By readjustment of telephone rates of the United States Telephone Company, long distance lines of independent telephone companies, several charges for service from Toledo to points in Michigan have been changed. The most notable change is an increase of five cents in the toll charges between Toledo and Detroit. The rate, formerly 35 cents, has been raised to 40 cents. To several points toll rates have been rduced correspondingly. Instead of fixing rates according to locations of county seats rates now are fixed according to air line measurements.

CONSTRUCTION NOTES.

ARKADELPHIA, ARK.—The Southwestern Telephone and Telegraph Company will rebuild the telephone plant in that city.

BETHEL, DEL.—Another telephone line is to be installed between Laurel and Bethel to be known as the Bethel-Woodrow Wilson Rural Telephone line. Samuel J. Furniss, state senator-elect from the second senatorial district, has been selected agent.

BIRMINGHAM, ALA.—Out of an appropriation of over $400,000 in bettering local physical equipment the Southern Bell Telephone & Telegraph Company has completed and put into service additions to its main exchange switchboard at a cost of upwards of $75,000. This, perhaps more than any one factor, has improved the service as it tends to relieve the congestion brought about by the enormous increase in business thrown on the Bell company when the Peoples company went out of business.

BOSTON, MASS.—Work of constructing the new Back Bay telephone exchange of the New England Telephone & Telegraph Company on Belvidere street, opposite the Mechanic Arts high school, will be started at once. The building and site will cost $500,000. The site of the proposed new exchange on Belvidere street is a mile or so west of the present exchange, which is located at 208 Newbury street. The present Back Bay exchange building is to be utilized as a training school for operators of the Boston division.

BURLINGTON, WIS.—The Bell Telephone Company is adding to and improving the exchange at Burlington. This exchange has been behind the times in the matter of equipment. When the changes are made it will be one of the most modern plants in the state.

CANADIAN, TEX.—The Southwestern Telephone and Telegraph Company will begin at once to rebuild the entire exchange at this place, at a cost of $10,000. The improvements were decided upon after a visit here of District Superintendent Henderson of Dallas.

CANTON, ILL.—The United Farmers' Telephone Company, will expend $1,200 in rebuilding its cable line inside the city. The contract has been given to the telephone company.

CANTON, ILL.—As the new building of the Canton Home Telephone Company nears completion it is evident to all that it will be one of the finest and most complete business blocks in the city. The walls are finished, with the exception of the front, which is of enameled brick in white and green, with ornamental designs.

CHARLOTTE, N. C.—The Salisbury branch of the Southern Bell Telephone Company is making ready to do about $30,000 worth of improving and extending. Large cables will be put in over the city and to some of the outlying sections of the city. It is the intention of the company to bring the Salisbury and

Spencer system up to the standard in every way. Some improvements will also be made in the exchange.

Checotah, Okla.—A large force of linemen and laborers have commenced work on the new telephone plant to be put in here by the Pioneer Telephone Company. The new system is to be one of the most modern and up-to-date constructions in the southwest. It is to be rebuilt from the ground up, and will be three to four months in construction.

College Springs, Ia.—A new telephone building is being erected on Main street, 21-40 feet in size. The basement, which is the same size as the building, is made of cement blocks.

Colorado Springs, Col.—Beginning probably either late the coming year or early in 1914, the Mountain States Telegraph and Telephone Company will increase the capacity and improve the service of the local system by the erection of a new central building at a total cost of from $170,000 to $200,000. The building will be an addition to the present telephone company building at 120 East Kiowa street, adjoining it on the east, where the company some time ago acquired the property extending to the Y. W. C. A. home.

Davenport, Ia.—The Clinton County Telephone Company is now located in its new quarters in the Godard block. The new central office is strictly up-to-date in every particular. All new fixtures have been installed.

Dayton, Ore.—The Pati Telephone Company, recently organized, will build about 50 miles of line. Thomas Reed, president.

Delmar, Pa.—The Diamond State Telephone Company is making plans to move its office at Delmar and all-night service will be in effect the first of the year.

Desart, N. D.—A new telephone line is to be built from New England to Desart.

Durand, Mich.—The Union Telephone Company is at work resetting poles and stringing new wire and are repairing the line generally. It is expected Durand will have fine service when the work is completed.

Eau Clair, Wis.—The Wisconsin Telephone Company is preparing to build a copper long distance line to Anson, Jim Falls, Cobban, Cornell and Holcombe, thereby opening up a new territory.

Forsyth, Mont.—The board of county commissioners has given the Mountain States Telephone Company permission to attach arms and string their wires across the county bridge in the vicinity of Rosebud, which crosses the Yellowstone river.

Fort Smith, Ark.—The Southwestern Telegraph and Telephone Company is completing another additional line to its plant which will materially assist in enlarging its facilities. The new line will be able to accommodate 1,200 new telephones and is required because of the increasing business on the outskirts.

Fresno, Cal.—Approximately $50,000 will be spent by the Pacific Telephone and Telegraph Company during 1913 in extending and improving the telephone service in the city. The active work will be started immediately after the first of the year, and the first operations will be directed toward relieving congested wires.

Gadsden, Ala.—A telephone line from Murraycross to Gadsden, a distance of about twenty miles and serving about fifteen farmers, has been built and connected with the Southern Bell exchange here.

Gaffney, S. C.—The telephone company in Gaffney proposes to improve its system, replacing the old style plan at present in operation with a common-battery system. It is necessary, however, to have the approval of the city fathers before this work can be carried out.

The Pitcher Telephone Company now has a through wire from Galena to Freeport, Rockford and Chicago.

Helena, Mont.—Work on the proposed Helena to Kensett Telephone line, which is to include the intermediate towns and territory between this city and the northern terminal, will begin as soon as the final details looking to actual labor of the undertaking can be properly disposed. The line will follow the roadbed or right of way of the Missouri and North Arkansas Railroad, giving to those cities along the line of the road the benefits of an individual service.

Huntsville, Tex.—The work of rebuilding the local telephone system has begun. The Southwestern Telegraph and Telephone Company recently purchased this exchange of the Central Texas Telephone Company, and in granting the new company a franchise the city council stipulated that the exchange should be practically rebuilt. As soon as the work is completed the rates will be raised 50 cents per month on both business and residence telephones.

Jackson, Mich.—The Bell Telephone Company will in the next few months expend sereral thousand dollars improving the service in and around Jackson, according to Manager Stevens. The power plant of the company is already being remodeled, and the old test panel is being replaced with one of more modern design, while the gravity batteries have been removed from the first floor of the local plant to make room for additional distribution frames to carry wires that run from the cables to the switchboards, in anticipation of the growth of the city.

Lexington, Ky.—The Cumberland Telephone & Telegraph Company is hurriedly constructing the lines along the new Lexington & Eastern Railroad into the coal fields of this county in order to get ahead of other companies preparing to build in. When this line is completed direct connection will be given with Lexington, Winchester, Louisville and the central section of the state—making a most important connection. The Eastern Kentucky Home Telephone Company is now constructing a long distance line from this city via McRoberts to Jenkins—through the heart of the coal fields.

Louisville, Ky.—Contracts were let today by the Home Telephone Company for the new equipment of its central offices, made necessary by the recent acquisition of the Cumberland Telephone Company's local lines. The contracts call for the expenditure of between $15,000 and $17,000, and the work is expected to be completed by January 15. The exchange will then be able to accommodate about 1,000 new subscribers on its switchboard. The company now has in this county 3,500 subscribers, of which 3,100 are in this city, and has about 800 subscribers in Woodford county.

Marshfield, Wis.—A large consignment of telephone instruments has been received by the Soo line at Stevens Point for supplying every station on the north division with a dispatcher's telephone. This is in line with the policy of the railroad company to safeguard traffic and to carry on business with the greatest rapidity consistent with safety.

Muskegon, Mich.—When the United Home Telephone Company completes its new line from this city to Grand Haven and reconstructs the Fremont line, it will have expended $10,000 during the last year in system improvements. The company is now engaged in putting through an iron circuit to its Grand Haven exchange, already having a copper circuit to Fruitport, which is used for the Grand Haven business. The intention is to connect the Fruitport copper line with Grand Rapids and thus give another copper circuit to Muskegon-Grand Rapids business. Early next year the Fremont line is to be entirely rebuilt.

Nashville, Tenn.—The Nashville Division of the Cumberland Telephone & Telegraph Company will be enlarged, effective January 1, to include all territory in Middle Tennessee, East Tennessee, Central Kentucky and part of Northern Alabama.

New Orleans, La.—Contracts for the improvement of the Cumberland Telephone and Telegraph Company's new building, at Cardondelet and Poydras streets, will be let early in 1913, and the building completed during the year, according to an announcement made by General Manager Leland Hume. The sum to be expended is $300,000.

Port Huron, Mich.—The sum of $3,750 will be expended in Port Huron in improving the aerial and underground equipment of the Michigan State Telephone Company.

Pasadena, Cal.—The Home Telephone Company has announced proposed improvements, which include the installation of about 100 miles of cable and the removal of all duplicate poles.

Pittsburg, Pa.—Architects Alden & Harlow have plans about completed for remodeling the 5 and 10-story brick fireproof telephone exchange buildings on Seventh avenue for the C. D. & P. Telephone Company, to cost $40,000.

Pensacola, Fla.—The American Bell Telegraph and Telephone Company, which owns both the Western Union and Southern Bell Telephone Companies, is now having constructed a new long distance line, which will touch all of the points between Pensacola and Jacksonville. This line is being pushed ahead rapidly and within a short time the piling across Escambia bay will be completed. This will add to the facilities of the telephone as well as telegraph companies.

Placerville, Nev.—Negotiations are in progress for the installation of a telephone line between Tallac and the United States forest service headquarters in Lake Valley. The route proposed is to connect with Fallen Leaf, Glen Alpine Springs, Lawrence & Comstock's dairy ranch and Meyers Station.

Rock Island, Ill.—The Central Union Telephone Company has decided to erect a new and strictly modern building in Rock Island, work on which will begin next spring. At a recent meeting of the commercial officers of the company, the sum of $40,000 was appropriated for the new Rock Island plant, and work on

the plans and specifications will be inaugurated immediately. It is expected that the structure will be completed next year.

ROGERSON, IDAHO—Work on a telephone line from Rogerson to Contact and San Jacinto, as first step for its extension to Wells, Nev., in anticipation of the building of the railroad between these points, was begun under the direction of C. C. Winters.

RUSHVILLE, ILL.—The Schuyler County Telephone Company has a large force of men at work constructing the new city exchange. The exchange will be located in the Crandall building north of the George Little store building and will be equipped to handle 400 city patrons and fifty country lines; 7,000 feet of cable is to be used in the business district to convey wires into the exchange.

SACRAMENTO, CAL.—During the past year the Pacific Telephone and Telegraph Company has more than tripled the capacity of its Oak Park plant by installing a new central exchange office in a brick building at Magnolia and Thirty-fourth street. The operating switchboards in the new office can accommodate thirteen operators whereas the former offices permitted only three operators.

SAN DIEGO, CAL.—Home Telephone Company, alterations to office, 1027 Sixth, $400.

SHERIDAN, WYO.—Improvements to the local telephone system, for which plans have been approved and appropriations made by the Mountain States Telephone and Telegraph Company, will give the Sheridan exchange the best service and most modern equipment of any in the Rocky Mountain states outside of Denver and Salt Lake City. Extensions and improvements contemplated represent an investment of over $150,000.

SPRINGFIELD, MINN.—The Tri-State Telephone Company is building a line from Springfield to Lake Benton to connect with its long distance line to Granite Falls, Marshall and other points.

STELLA, NEB.—A metallic telephone toll line twenty-two miles long has been constructed between Howe and Humboldt. The line was built by the Farmers' Telephone Company of Howe and the Mutual Telephone Company of Humboldt. This is the first direct line between these two points.

WHEELING, W. VA.—The Bell Telephone Company of this city is making repairs to their old lines and putting in several new cables from the central office. General repairs are being made to the other departments of the division and new cables will be run to many of the lines in the McMechen district. The office here has been looking for quarters in the lower part of the city and in case a suitable room is secured, the office will be moved from the present quarters to the new location.

WILKES BARRE, PA.—At a recent meeting of the street committee it was decided to report out favorably a resolution granting the Bell Telephone Company permission to extend its system of underground conduits, provided the work is completed within five years. Several minor resolutions were approved.

FINANCIAL NOTES.

ALBANY, N. Y.—Notice was filed with the secretary of state by the Southwestern Telegraph and Telephone Company that it has increased its capital stock from $20,000,000 to $40,000,000, extended its corporate existence so it will be perpetual and increased its directors from seven to fifteen. The territory covered by the company is from Saratoga and Albany to Austin and Galveston, Tex., taking in the states of New York, Texas, Arkansas, Missorui, Illinois, Kansas, Oklahoma and adjoining states. The certificates are signed by Theodore N. Vail, U. N. Bethell, Charles H. Wilson, H. J. Pettengill, Royal A. Ferris and J. C. Crowley.

BOSTON, MASS.—The New England Telephone Company will probably realize this fiscal year a gain in total stations of between 35,000 and 40,000, making the aggregate at the close of the year approximately 460,000. This is an increase of nearly 10 per cent. For several years now the company's annual expansion in new stations has been about 10 per cent, which seems likely to be continued for at least two or three years to come. Gross earnings of the company this year will for the first time approximate the $16,000,000 mark. Owing to the $4,000,000 stock issue in July and the recent sale of bonds, share profits will this year be less than in 1911, although without doubt comfortably in excess of the 7 per cent dividend rate.

BOSTON, MASS.—The directors of the Providence Telephone Company have declared the regular quarterly dividend of $1 a share, payable January 1 to stock of record December 20.

BOSTON, MASS.—New York Transit Company declared a dividend of $10 a share, payable January 15, to stock record December 23. This is fourth dividend since segregation of Standard Oil Company.

BOSTON, MASS.—The directors of the New England Telephone & Telegraph Company declared the regular quarterly dividend of 1¾ per cent, payable December 31 to stock of record December 16.

CINCINNATI, OHIO—Cincinnati bondholders of the Central Home Telephone Company of Louisville have taken steps to organize a Bondholders' Protective Association, with a view of demanding from the trustees an accounting of the physical condition, the disbursements and the earning capacity of the property. They also manifest opposition to the reorganization plan affecting the Central Home and the Central Home Telephone and Telegraph Company. One of the features of the reorganization plan is that the bondholders exchange their bonds on a basis of 40 per cent for stock in the new company. The holders of the bonds contend that they are worth their face value. Four or five hundred thousand dollars of the bonds are owned in this city and vicinity.

CINCINNATI, OHIO—The Cincinnati and Suburban Bell Telephone Company will issue the new stock, authorized by the state commission, to meet the expense of the new building to be erected at Fourth avenue and Sycamore streets about the middle of February. The issue will represent $538,000 and will increase the capital stock to $7,596,050. It will be issued among the stockholders at par value and on a basis of one share to eleven.

DELTA, OHIO—The Cass County Home Telephone Company, Delta; increase, $150,085 to $200,085.

DE WITT, NEB.—The De Witt Telephone Company, organized in 1902, has been sold out to the Lincoln Telephone Company. The business has yielded the stockholders 8 per cent dividends every year since its organization.

FORT WAYNE, IND.—An increase in the capital stock of the Home Telephone and Telegraph Company of $250,000 and the expenditure of at least $75,000 in 1913 in improvements on the company's holdings, was voted at the sixteenth annual stockholders' meeting. The increase in capitalization will raise the common stock to $500,000 and the preferred stock to $350,000. The added capital stock will not be placed upon the market, but will be retained as treasury stock to be used in any extensive alterations in the equipment that might be ordered or decided upon and as an emergency fund.

The executive committee of the Fayette Home Telephone Company held a recent meeting and recommended an increase in the capital of the company of 100 per cent, the total stock being raised from $400,000 to $800,000. Later the stockholders of the company held a meeting for the purpose of ratification of the action of the executive board. The action was approved and the charter ordered amended so as to allow of an issue of $800,000 worth of stock. Aside from the increase of capitalization only routine business was considered.

LINCOLN, NEB.—The three big Bell telephone companies which have recently been merged in the southwest had a combined capital of $30,000,000. After the merger the capital is to be $40,000,000.

LANSING, MICH.—Citizens' Telephone Company was the first company to report its earnings, which is demanded by the new city charter. The report states that the corporation did a business of $54,740, and that the expense of operation was $31,143, which left an earning for the year of $23,596. All public utilities corporations are required to make a report on their earnings in this city.

NEW YORK, N. Y.—The Cumberland Telephone Company reports total income for the year ended October 31, 1912, of $7,804,180. After taxes, expenses and depreciation charges amounting to $5,545,077 there were net profits of $2,259,103. The surplus after interest and dividend charges was $454,085.

OWENSBORO, KY.—The Rural Home Telephone Company, which was organized in August, 1903, and which has operated several exchanges in this county, went into liquidation as soon as possible, in accordance with the decision of the stockholders. Its properties, valued at $50,000, was sold December 20.

PHILADELPHIA, PA.—November net earnings of the Keystone Telephone Company show an increase of $6,405 to $55,041, and surplus of $29,783, an increase of $6,117.

PORTLAND, ORE.—The quarterly financial report of the Pacific Telephone & Telegraph Company filed with the city auditor, shows operating revenue amounting to $291,898.27 and operating expenses amounting to $252,031.71. The total value of the plant and the property of the company, is given at $4,399,830.73.

WILLMAR, MINN.—The property of the Minnesota Central Telephone Company has been purchased by the Northwestern Telephone Company for $600.000.

TRENTON, N. J.—Chancellor Walker discharged Frederick L.

Johnson as receiver for the United States Independent Telephone Company and ordered that the company be dissolved and its charter forfeited. The receiver said claims exceeding $2,000,000 had been satisfied by assessment of shares.

FRANCHISES.

ATLANTA, GA.—A commission has been issued to the Cross Keys Telephone Company, with a capital stock of $1,000. The petitioners are L. J. Browning and W. H. Wilburn.

CARTHAGE, MO.—The application of A. J. Jordon and others for the right and privilege of constructing a telephone line in Union township, operated by a company designated as the Parshley Telephone Company, has been approved.

CLE ELUM, WASH.—The Pacific Telephone and Telegraph Company has been granted a franchise here.

DEKALB, ILL.—Benjamin Knappenberg, president of the Farmers' Union Telephone Company, which operates lines north of Kirkland and in Boone and Winnebago counties, is negotiating for a franchise to build a line into DeKalb. The company is said to also be contemplating a franchise at Sycamore.

DECATUR, ILL.—The Bell Telephone Company has filed its acceptance of the proposed franchise in Decatur. The matter will now be submitted to a vote of the people.

EAST ROCHESTER, N. Y.—At a meeting of the village board a special franchise was granted the Bell Telephone Company to construct and operate a telephone system in this village. All wiring will be laid in conduit in the streets. The Bell company has already leased the second floor of the March block and will install its headquarters and central office at once. This office will be maintained as central for East Rochester, Fairport, Webster, Penfield and Brighton.

EMINENCE, KY.—The city council has passed an ordinance authorizing the sale of a franchise to operate a telephone exchange in the city. It is understood that the two companies now operating are to merge, and the new company will operate under the proposed franchise.

HILLSBORO, ILL.—The village board has granted a 50-year franchise to the People's Mutual Telephone Company to construct a telephone line through the village. The proposed line will extend from Hillsboro to Irving.

NORTH ST. PAUL, MINN.—The Tri-State Telephone Company has applied for a local franchise.

PADUCAH, KY.—A franchise was sold by the city council at Wickliffe to the Paducah Home Telephone Company on the bid of Manager Jeffery. The company will begin the erection of a plant there at once. A long-distance line also will be built from Paducah to Cairo, Ill., through Wickliffe.

PORTLAND, ORE.—The Pacific Telephone Company was granted a 15-year franchise to erect their poles along the Multnomah county roads by the county commissioners at their meeting. Application was made for the franchise more than a year ago.

RIO GRANDE CITY, TEXAS.—The prospect for a city telephone system for Rio Grande City is now about to be a reality. James Beasley and several associates from East Texas have made application to the commissioners court for a franchise for the purpose of installing a local exchange in this city and the privilege of extending to other towns throughout the county. The company will charter at once.

ROCK ISLAND, ILL.—The Tri-City Automatic Telephone Company was given a franchise in Rock Island by a vote of 1,545 to 475. In Moline the company won out by 86 per cent of the votes in favor of the franchise. The company is now waiting for the action of the Davenport council, as they are unable to start work until given permission by the local board.

SWITZER, S. C.—A commission has been issued to the Switzer Telephone Company of Switzer in Spartanburg county. The petitioners are J. D. Darby, J. P. Gates, Jas. M. Switzer and Walter Cox.

VIRGINIA, MINN.—The Range Telephone Company will within a few weeks make application for a franchise in Virginia.

WICKLIFFE, KY.—A franchise has been sold to the Paducah Home Telephone Company and this company will begin the erection of a plant here at once. A long-distance line will also be built from Paducah to Cairo, through this place.

MISCELLANEOUS.

AUSTIN, TEX.—Office of United Telephone Company at Stonewall destroyed by fire. Loss $1,800. Exchange was in residence owned by a Mr. Collinburger. No insurance.

BINGHAMTON, N. Y.—Telephone competition in this city is to be eliminated by a consolidation of the York State and Bell Telephone Companies. When the consolidation is effected, it is believed that a new building will be erected here.

BLOOMINGTON, ILL.—The Beason Telephone Company has sold its lines to the Lincoln Company and a change of management will be made January 1.

BOSTON, MASS.—Representative-elect Andrew A. Cassassa of Revere filed with the clerk of the House a petition asking for legislation to provide for the appointment by the governor of a commission of three persons to investigate telephone rates and service in Massachusetts, and especially in the metropolitan district, and to report to the General Court of 1914.

BRIGHAM CITY, UTAH.—The city council has decided to consider the matter of a municipal telephone system for Brigham. At its last meeting the proposition was discussed freely and at some length and the council decided to secure the sentiment of the people in regard to the matter. The manner in which they will proceed was not stated, but it is likely that at some future date a mass meeting will be called for this purpose. This matter has been before the different councils for a number of years and the subject is not a new one.

BROWNSVILLE, TEX.—The new flashlight switchboard, replacing the old style drop board, was inaugurated at the local telephone office. The board has been in process of installation the past two months. The number of subscribers to telephone service has doubled in the past two years and the company installed a board of sufficient capacity to care for a city of 20,000 people.

CARLTON, MINN.—The Zenith Telephone Company has annexed the Atkinson Farmers' line, running down from here through the outlying districts around Atkinson, Mahtowa and east. There are about twenty new numbers attached to the Zenith phone and that gives Carlton people a lot of additional calls.

CHEYENNE, WYO.—The Mountain States Telephone and Telegraph Company is making preparations that patrons may obtain the best possible service during the long winter period, by patrolling the lines throughout Star Valley and to Montpelier, Ida. Foreman J. F. Ellinger has charge of the work, assisted by G. E. Goodell and C. C. Clark. Aside from this it has reduced the toll rates from Star Valley to outside points, which will be beneficial to all subscribers.

CORSICANA, TEX.—J. H. Galbreath of Corsicana and J. H. Fox of Hereford have purchased the Independent Telephone Exchange of Corsicana, Kerens, Tyler, Chandler, Winona, Big Sandy and Hawkins. All local independent lines are included in the purchase, together with the long distance line from Corsicana to Pritchett, Upshur county.

CROWN POINT, IND.—The Indiana Union Telephone and Telegraph Company, of Indianapolis, a subsidiary of the American Telephone and Telegraph Company, has purchased the plant of the Crown Point Telephone Company for $50,000. By acquiring this property the Bell system now controls all telephone lines in northwestern Indiana. The Indianapolis company took over the management of the Crown Point plants. The plants' franchises run for thirty-three years.

EUREKA, ILL.—The Eureka Farmers' Telephone Company has sold the plant of the telephone exchange to M. F. Melick of West Liberty, Ia., and the transfer of the business and management of the local exchange passed into the hands of Clayton Melick, a son, the first day of January, 1913.

GREAT FALLS, MONT.—Formal announcement was made by the Mountain States Telephone Company that the company had acquired options on a great majority of the stock of the Great Falls Automatic Telephone Company and that the Mountain States Company will exercise its right under the options and consolidate the two local exchanges, the consolidated service to date from January 1, 1913. The consolidated service will be by the use of the automatic telephones and the Great Falls exchange will be the present plant of the independent company.

HOPKINSVILLE, KY.—When fire destroyed the plant of the Home Telephone Company at this place the entire fire alarm system of Hopkinsville was put out of commission. The Home Telephone Company operated an automatic system that included a fire alarm for the city and now the fire department will have to be notified by private message over the Cumberland telephone. The destruction of the telephone plant caused a loss of $22,000, with only $8,000 insurance.

KEOKUK, IA.—Announcement has been made by company officials that the Iowa Telephone Company has taken over the plant of the Mississippi Valley Telephone Company and both will be operated from the same exchange henceforth. The consolidation of the companies has been expected for several months. It will affect hundreds of farmers, most of whom were using the Mississippi Valley Company service. All these phones will have to be changed.

KINDERHOOK, N. J.—The Northern Columbia and Rensselaer Telephone Company at annual meeting elected the following

board of directors: Clarence Kittell, William H. Peterson, Roscoe C. Waterbury, Charles M. Bray, Thomas M. Kittell, George Smith, William C. Herrick, Edwin Langford and John W. Mesick.

LIBERTY, MO.—A meeting of the directors of the Clay County Telephone Company, at which the building of a trunk line from here to Excelsior Springs was discussed and decided upon, was held after which an inspection of a number of lines running out of here was made. Reports made at the meeting evidenced a constantly increasing business and a demand for telephones that is almost impossible to supply with the present limited capital, according to one of the directors.

LIMA, O.—In line with the gradual elimination of the dual telephone systems in Ohio, the Central Union Telephone Company has sold to the Lima Telephone & Telegraph Company its exchange and equipment in Lima. The two systems will be consolidated and all subscribers served from one exchange. The toll lines of the Central Union Telephone Company and the long distance lines of the American Telephone & Telegraph Company will be used by the new company. About 7,000 telephone subscribers are affected by the change.

LOUISVILLE, KY.—Following an agreement between trustees and bondholders of the Central Home Telephone Company, Judge Samuel Kirby dismissed the petition filed by the bondholders to enjoin a reorganization of the concern which had been planned.

MARENGO, IA.—At the annual meeting of the Iowa County Mutual Telephone Company the finances of the company were declared to be in the best of shape. The following officers were elected: R. I. Smith, president; A. A. McGivern, vice president; Dennis Sullivan, secretary; A. M. Brimmer, treasurer. The following were chosen directors: G. W. Danskin, J. D. Williams and George Tromhauser.

MARION IA.—The directors of the Farmers' and Merchants' Telephone Company at its regular meeting transacted the work of the coming quarter and placed the assessment at $1.25. The Ottumwa commercial line is now completed by the Ottumwa Telephone & Electric Company and is now a metallic line from Ottumwa to Eldon, and better service is promised in the near future.

MISSOULA, MONT.—The Mountain States Telephone Company has removed all of its telephones in Ronan and has discontinued the office. There is now only a toll line into Missoula.

NEBRASKA CITY, NEB.—The board of city commissioners has instructed the city attorney to investigate the telephone merger at this place and protect the interests of the people in any way he may deem proper. The two systems have been merged here.

NEW YORK, N. Y.—The Southwestern Telegraph and Telephone Company, which recently was incorporated in this State with $40,000,000 capital, will take over the properties of the Bell Telephone Company of Missouri, the Southwestern Telephone Company and the Missouri and Kansas Telephone Company, all subsidiaries of the American Telephone and Telegraph Company.

NORWAY, KAN.—Three of the largest Farmers' Telephone companies in Republic county, the Republican Valley, the Norway and the Rydal systems, have consolidated by mutual agreement for their general good and future welfare. Heretofore the systems have been separate companies, with their own officers, but from now on will operate under one board of directors.

OAKLAND, CAL. It is pretty generally conceded that the telephone lines in this place are to be merged. It is understood that the Bell people are to secure control of all the lines here.

ORANGE, TEXAS.—The Southwestern Telephone Company exchange was let to Lucy Sanderson and Lyle Patterson of Houston.

OWINGSVILLE, KY.—Allen H. Points, cashier of the Salt Lick Deposit Bank of Salt Lick, this county, has closed a deal with the Yale & Salt Lick Telephone Company by which he became owner of the telephone line running from Owingsville to Salt Lick, Farmers, Yale and Olympian Springs. The price paid was $4,000 including the franchise and all properties.

PETOSKEY, MICH.—Petoskey telephone subscribers who have been in the habit of calling by name will hereafter be required to give the number, as the result of a change made by E. J. Holihan, the new Bell manager, recently transferred from Manistee. Other improvements, including a new ringing system, are being made.

POCATELLO, IDA.—The exchange managers of the Mountain State Telephone & Telegraph Company in the Pocatello district held a three days' conference in the Gate city, the meeting being presided over by District Manager J. A. Kincaid. Such matters as uniform accounting, details of management and the general good of the service were discussed. The meetings were conducted by the district manager in conjunction with Division Plant Superintendent H. W. Kline and Division Traffic Superintendent C. R. Siegel of Salt Lake City, Traveling Auditor H. C. Long, District Cashier E. P. Calph and District Wire Chief C. W. Bulkley.

ROCKFORD, ILL.—The DeKalb County Telephone Company has granted free service to the former patrons to the following places: Sycamore, Claire, Esmond, Fairdale, Kirkland, Kingston, Geneva, this also includes the surrounding vicinity to which many have again replaced their telephones.

SAN FRANCISCO, CAL.—Superior court in San Francisco has decided against city and county of San Francisco in suit to set aside sale of Home Telephone Company to Pacific Telegraph & Telephone Company. The city sued to set the sale aside on ground that it was voided by a provision in the Home Company's franchise forbidding it to sell or transfer its property, rights or privileges under the franchise. Judge Ellison holds that this provision is null and upholds defendant corporation's demurrer to the city's complaint. This decision is of wide purport, as many California corporations hold franchises containing just such clauses prohibiting sale of the franchises.

SAN ANTONIO, TEXAS.—The Hackberry Telephone Company of Fate, Rockwell county, filed certificate of dissolution.

SHARPSBURG, KY.—By agreement of the board of directors of the Sharpsburg Home Telephone Company and the Bath Home Telephone Company the two companies have been consolidated, and will be known as the Bath Home Telephone Company.

SHREVEPORT, LA.—That the population of Shreveport fifteen years hence will be 80,000 is the estimate made by local officials of the Cumberland Telephone Company, after a careful count, showing that there are 6,761 residences here, and the population has been increasing a little more than 21 per cent anually.

SPRINGFIELD, ORE.—The telephone users of the Pleasant Hill country desire to be independent of the Pacific Telephone & Telegraph Company, which owns or controls most of the lines in this county, and have refused to enter into a contract with the company for connections another year. At a meeting of the telephone users of Pleasant Hill, Trent, Dexter and Goshen at Pleasant Hill, the representatives of the farmers' lines, which are owned by local associations, emphatically refused to sign the switchboard contracts offered by the company, declaring that before they would bind themselves in the manner asked, they would establish a central station of their own at Springfield, taking up the problem of getting into Eugene later.

STEAMBOAT SPRINGS, COLO.—A merger of the Routt county Mutual Telephone lines with the Mountain States Company has caused trouble for another mutual company at Craig and the one here, the three mutual companies formerly occupying this field having exchanged business and used the Routt Mutual between Steamboat Springs and Craig. The two mutuals remaining expect to run an independent line between Craig and Steamboat Springs, and also into Oak Creek and Yampa.

ST. JOSEPH, MO.—Two squads of electrical engineers are engaged in working out the details for the merger of the St. Joseph Bell and Home telephone plants, lately authorized by city ordinance, and representatives of the Bell Company, which is taking over the properties of the Home Company, said that the consolidation will be consummated as soon as possible.

TOMBSTONE, ARIZ.—The city of Douglas lost out in the first round of its fight with the Mountain States Telephone & Telegraph Company, when Judge Sutter of the superior court, after hearing arguments of the attorneys, refused to grant a temporary injunction to restrain the company from completing its construction work in Douglas. The court set a date early in January for trial of the case upon its merits, at which time it will be decided whether a permanent injunction shall be issued.

TRENTON, PA.—Chancellor Walker recently made an order forfeiting the charter of the United States Independent Telephone Company and discharging Frederic L. Johnson as receiver. The order dissolves the corporation, against which suit was brought by James M. E. O'Grady, a stockholder. Claims against the company amounting to $2,000,000 have been settled.

WASHINGTON, TEXAS.—The Phillipsburg Telephone Company of Washington filed a certificate of dissolution.

WICHITA, KAN.—The Kinsley Telephone Company's patrons allege mismanagement and a receiver has been named for it.

WINCHESTER, KY.—The announcement of the transfer of the property of the Old Kentucky Telephone and Telegraph Company to the Southern Bell Telephone Company, of Atlanta, Ga., has been made. The transfer includes the plants in this city and Mt. Sterling.

WYMORE, NEB.—What is believed to be the conclusion of the warfare between the people of Wymore and the Lincoln Telephone & Telegraph Company is an agreement tentatively reached,

whereby the company has consented to restore the service formerly given to and from Odell, Barneston and Liberty. This concession was secured as the result of the organization of a new company with local capital, which has been given a franchise to construct another exchange in Wymore.

JOLIET, ILL.—That Joliet has shown a greater growth in telephone installation than any other city in the state was declared when the Chicago Telephone Company announced that it had passed the 6,000 mark. Although Joliet does not boast of a greater number of subscribers than any other city its growth is declared to be proportionately greater than any other.

NEW YORK, N. Y.—The stockholders of the Western Telephone and Telegraph Company have voted to dissolve the company. The directors will set a date for the sale of the company's assets, when they will be bid in by the American Telephone and Telegraph Company, which owns ninety per cent of the outstanding stocks. The practical dissolution of the company and the realignment of its various subsidiary companies into other operating units of the American Telephone and Telegraph Company were effected some time ago. The dissolution proceedings are necessary to comply with the law. The Western Telephone and Telegraph Company was composed of the Wisconsin Telephone Company, the Cleveland Telephone Company, the Southwestern Telephone Company and the Northwestern Telephone Company.

CARSON CITY, NEV.—The United Farmers' Telephone and Telegraph Company has obtained control of the Nevada Consolidated Telephone Company lines at Carson City.

DODGE CITY, KANS.—According to A. G. Barnett and Dr. Lindas, officials of the Arkansas Valley Telephone Company, a toll line will be built from this city to Hugoton along the Santa Fe new Colmar cut-off in the near future. The line will be suspended on the railroad poles and will be built to Montezuma at once.

CEDAR RAPIDS, IOWA.—The business affairs of the Jones County Telephone Company have been placed in the hands of a receiver. Clifford B. Paul, of Anamosa, has been appointed by the court to act as such, his bond to be $20,000. The company has about 153 miles of line in the county, with two central stations, one at Monticello and the other at Anamosa.

FOSSTON, MINN.—The Garden Valley Telephone Company has been granted admission to the city.

SALT LAKE CITY, UTAH.—W. H. Bywater, chief of the Fire department, has recommended to Mayor S. C. Park the installation of a telephone system for fire alarm purposes, which will be absolutely independent of the local telephone system.

COLUMBUS, IND.—The Citizens Telephone Company of this city has bought all of the physical property of the Central Union Telephone Company in Columbus and Bartholomew counties. The two plants have been consolidated and management of the Citizens Telephone Company, which is owned by the New Long Distance Telephone Company, of Indianapolis.

PEORIA, ILL.—One thousand gallons of paint reached Peoria from Milwaukee and a crew of Central Union telephone workmen immediately began applying it to the poles owned by that Company throughout the city of Peoria.

AURORA, ILL.—Officials of the Inter-State Independent Telephone Company have issued an emphatic denial of the story appearing in a Chicago paper to the effect that their company has been taken over by the Bell interests. They declare the Inter-State Company is now spending large sums of money in new apparatus and equipment and that no proposition for the disposal of the company's interest have been entertained.

LINCOLN, ILL.—With the sale of $15,000 in stock of the Central Illinois Telephone and Telegraph Company, the control of the company has passed into the hands of Judge E. D. Blinn and others. E. D. Blinn, Jr. succeeds P. M. Biwer as head of the company.

KINGSTON, N. Y.—The Citizens' Standard Telephone Company has passed out of existence in Kingston, Rosendale, Phoenecia, Shokan and High Falls and all over the country lines in Ulster county. This ends the dual telephone system in Kingston and does away with all the exchanges along the Hudson river that have been connected with the Citizens' Standard system and unites them with the New York Telephone Company exchanges, with the one exception of the city of Hudson, between New York and Albany.

ROXBURY, MASS.—The New England Telephone and Telegraph Company of New York has bought a frame dwelling together with 12,562 square feet of land at 26 Waverly street, near Perrin street.

AURORA, ILL.—The annual meeting of the stockholders of the Inter-State Telephone and Telegraph Company recently held at Jersey City, N. J., resulted in the following directors being elected: From Toledo, Ohio, E. J. Marshall, E. H. Cody, George W. Walbridge, H. R. Shepherd, S. P. Kennisen, George L. Dixon, B. J. Welsch; S. W. Lord, Detroit; C. N. King, Jersey City; L. C. Griffitts, and E. L. Barber, Aurora; H. H. Evans, Aurora; H. D. Wagner, Hinckley; A. S. Clow, Wheatland, and E. F. Lawrence, of Streator, who were previously on the board of directors, will remain in the same capacity until 1913.

WOODSTOCK, ILL.—Long distance automatic telephone service between Chicago and Woodstock has been opened. County Judge John E. Owens called up Mayor Donovan at Woodstock. "I congratulate you on your telephone system," said Judge Owens. Judge Owens talked with the mayor for several minutes.

MUNCIE, IND.—The Central Union Telephone Company completed the purchase of the Delaware and Madison Counties Telephone Company, having exchanges in Muncie, Anderson, Elwood, Alexandria, Gaston and smaller towns. The company failed to obtain the Anderson plant owing to complications with the city.

COLORADO SPRINGS, COL.—The purchase by the Mountain States Telephone and Telegraph Company of the property on East Kiowa, on the east east side of the Telephone building, means the expenditure of about $25,000. From the head officials of the telephone company in Denver it was learned that the purchase has been made more with the idea of protecting the company in the future than from any actual existing necessity for more space.

BALTIMORE, MD.—The Protective Telephone Association continues growing. It has been arranged for notification to reach the secretary in advance of dates set for hearings of complaints that may be made by telephone subscribers to the public service commission. The association will soon be incorporated and made a permanent organization. Dr. A. R. L. Dohme, the president, is still abroad.

CARLINVILLE, ILL.—The Carlinville Telephone Company has added to the convenience and safety of the town by placing an alarm gong on a telephone pole near the central office. If anyone calls for the police in the night on account of any disturbance or fire, an operator will ring the gong for the police. It will ring loud enough for the police to hear it anywhere on their beat in the business part of town.

BALTIMORE, MD.—Objection on the part of the Chesapeake and Potomac Telephone Company to an annual tax of $1 for signs projecting from buildings was overruled by the board of estimates. Capt. Frank S. Whitman and Charles H. Carter asked that the tax be abolished, contending that it worked a hardship on many persons.

PEORIA, ILL.—The Central Union Telephone Company is to be ordered to cease doing business in this city because of alleged poor service, excessive rates and failures to comply with franchise conditions. A resolution asking the draft of an ordinance to this effect passed the city council by a vote of 11 to 4. The resolution requires the corporation counsel to draw an ordinance repealing the franchise under which the Central Union Company is operating.

CHICAGO, ILL.—It is understood that the interests back of the Automatic Telephone Company soon will exercise their option to purchase the Automatic Electric Company stock. The latter concern owns automatic telephone patents and is a manufacturing concern. It is reported that the deal will be made through the purchase of the Automatic Electric Company by the Chicago Utilities Company.

MARYSVILLE, O.—Plans are being made by the Union County Telephone Company, of Marysville, to take over the property and business of the Central Union Telephone Company there. In connection with the proposition it is proposed to spend about $18,000 on improvements and extensions. It is understood that the former company intends to increase telephone rates about twenty-five per cent after the consolidation.

DETROIT, MICH.—The Detroit telephone squabble bids fair to remain in litigation for some time. Two suits are now pending with a view of preventing the merger of the Michigan State with the Home Telephone and the other companies doing business in the vicinity of Detroit. Despite this, Attorney James O. Murfin, representing the American Telephone and Telegraph Company, says that the merger of the Detroit companies is to be consummated immediately.

ASHTABULA, O.—The Bell Telephone Company's exchange at Kingsville sold to the Kingsville Telephone Company for $5,000. Residents there organized the new company after rates were boosted by the Bell Company.

ATKINSON, WIS.—The Western Electric Company of Chicago has completed the installation of a seven-section, No. 9 switchboard at the Wisconsin Telephone Company's exchange in this city.